

# Three new species of the genus *Scaphicoma* Motschulsky, 1863 (Coleoptera, Staphylinidae, Scaphidiinae) from Northern Sulawesi, Indonesia

Ryo Ogawa<sup>1,†</sup>, Ivan Löbl<sup>2,‡</sup>, Kaoru Maeto<sup>1,§</sup>

**1** Laboratory of Insect Biodiversity and Ecosystem Science, Graduate School of Agricultural Science, Kobe University, 1-1 Rokkodai, Nada-ku, Kobe, 657-8501 Japan **2** Muséum d'histoire naturelle, Route de Malagnou 1, CH-1208 Geneva, Switzerland

† <http://zoobank.org/80A4671A-D58C-4903-9A22-F700FAD0F1C3>

‡ <http://zoobank.org/E348BD58-6B15-4917-A000-06E38926BF54>

§ <http://zoobank.org/BEBD5A8E-EC49-42CF-8E1E-C375287A0B36>

Corresponding author: Ryo Ogawa (ailmasbl0854@yahoo.co.jp)

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## Abstract

Three new species of the genus *Scaphicoma* Motschulsky, 1863 from Sulawesi, Indonesia are illustrated and described: *Scaphicoma subflava* Ogawa & Löbl, **sp. n.**, *S. bidentia* Ogawa & Löbl, **sp. n.**, and *S. quadrifasciata* Ogawa & Löbl, **sp. n.** *Lepteroscapha pallens* Achard, 1921 is designated as the type species of the genus *Lepteroscapha* Achard, 1921.

## Keywords

Scaphidiinae, *Scaphicoma*, new species, male and female genitalia, Sulawesi, Indonesia, Sundaland

## Introduction

The genus *Scaphicoma* Motschulsky, 1863 currently includes 16 species (Achard 1920; Löbl 1971, 1973, 1984, 1990, 1992, 2003; Löbl and Leschen 2010; Ogawa and Hoshina 2012; Pic 1915, 1923), which are mainly distributed in Southeast Asia, with the exception of *S. hiranoi* (Hoshina, 2008) from Japan, *S. antennalis* (Achard, 1922) and *S. yapo* Löbl

& Leschen, 2010 from tropical Africa, and *S. gracilis* Löbl, 1971 and *S. montheisi* Löbl & Leschen, 2010 from New Ireland and Australia, respectively. This genus may be easily distinguished from other scaphidiines by body elongate, strongly convex in dorsal view, hind tarsus longer than hind tibia, mesepimera fused, and strongly elongate antennae.

In this paper, we describe three new species of the genus *Scaphicoma* from the northern and central parts of Sulawesi, Indonesia, and discuss the relationships among these new species and their relatives with respect to the geohistory of Sulawesi. In addition, we designate a type species of the genus *Lepteroscapha*.

## Material and methods

The specimens examined were collected by the first author or had been deposited at MHNG (see below). We refer to Ogawa and Löbl (2013) and the references quoted therein for methods and terminological conventions.

The abbreviations used herein are as follows:

<b>EL</b>	length of elytra from base of pronotum to apex of elytra
<b>EW</b>	maximum width of elytra
<b>HW</b>	maximum width of head including eye
<b>ID</b>	interocular distance
<b>PL</b>	maximum length of pronotum
<b>PW</b>	maximum width of pronotum
<b>EUMJ</b>	Ehime University Museum, Matsuyama, Japan
<b>HUOI</b>	Hasanuddin University, R. Ogawa collection, Makassar, Indonesia
<b>MZBI</b>	Museum Zoologicum Bogoriense, Bogor, Indonesia
<b>MHNG</b>	Muséum d'histoire naturelle, Genève, Switzerland
<b>RISTEK</b>	Ministry of State for Research and Technology, Indonesia

## Systematics

### *Scaphicoma* Motschulsky, 1863 [gender: feminine]

<http://species-id.net/wiki/Scaphicoma>

*Scaphicoma* Motschulsky, 1863: 435; type species: *Scaphicoma flavovittata* Motschulsky, 1863; by monotypy.

*Lepteroscapha* Achard, 1921: 88; type species: *Lepteroscapha pallens* Achard, 1921; by present designation. Synonymy: Löbl 1971.

**Note.** Achard (1921) established *Lepteroscapha* for three new species, *L. pallens*, *L. nigrovittata*, and *L. filiformis*. A type species was not designated. Therefore, we designate here *L. pallens* Achard, 1921 as the type species.

**Key to Sulawesi species of *Scaphicoma***

- 1      Body unicolorous (Fig. 1a, b).....**2**
- Body bicolorous (Fig. 1c). Ventral surface with iridescent luster due to microsculptures. Parameres enlarged subapically and tapering to apex, weakly pointed around subapical portion in dorsal view..... ***S. quadrifasciata* sp. n.**
- 2      Body yellowish-brown to reddish-brown. Ventral surface not iridescent. Body 2.55–2.75 mm long. Antennomere XI about 1.6 times as long as VIII; IV and V shorter than VI. Mesotarsomere I about 1.2 times as long as II and about 2.2 times as long as IV; V about 1.5 times as long as IV. Metatarsomeres I about 1.5 times as long as II; IV almost as V length. Male sternite VII with strongly concave middle of apical margin. Parameres asymmetrical. Bursa copulatrix sclerotized (Fig. 2c) ..... ***S. subflava* sp. n.**
- Body dark reddish-brown. Body 2.25–2.44 mm long. Antennomere XI about two times as long as VIII; IV and V almost same as VI. Mesotarsomere I about 1.5 times as long as II; V about 2 times as long as IV. Metatarsomere I about 2.0 times as long as II and about 2.5 times as long as IV; V about 0.7 times as long as IV. Male and female sternite VII with moderately concave middle of apical margin. Paramere symmetrical, weakly enlarged subapically. Bursa copulatrix not sclerotized (Fig. 3c) ..... ***S. bidentia* sp. n.**

***Scaphicoma subflava* Ogawa & Löbl, sp. n.**

<http://zoobank.org/5EF0186B-9ECA-4998-805B-BC38A0450214>

[http://species-id.net/wiki/Scaphicoma\\_subflava](http://species-id.net/wiki/Scaphicoma_subflava)

Figs 1a, 2, 5

**Diagnosis.** Most of body yellowish-brown. Body size relatively moderate. Antennomere XI about 1.6 times as long as VIII; IV and V each shorter than VI. Protarsomeres I–III and V each about two times as long as IV. Mesotarsomeres I about 1.2 times as long as II and III; V about 1.5 times as long as IV. Metatarsomeres I about 1.5 times as long as II and III; II and III each about 1.5 times as long as IV and V. Male sternite VII with middle of apical margin strongly concave. Parameres asymmetrical. Internal sac on basal portion covered with scale-like sclerites, and with pair of sclerites on apical portion. Bursa copulatrix sclerotized.

**Description.** Body, shining. Most of body including head, pronotum and elytra yellowish-brown, except for darkened mesoventrite (Fig. 1a). Antennae yellowish-brown, except of antennomeres VII–XI dark yellowish-brown. Head, pronotum and elytra sparsely and finely pubescent.

Head with interocular distance almost as eye width. Punctuation sparse and fine. Antennomeres I–VI with a few macrosetae, VII–XI covered with some microsetae; VI about two times as long as III; IV and V each shorter than VI; VII almost as VIII; XI about 1.6 times as long as VIII (Fig. 2e).



**Figure 1.** Habitus of *Scaphicoma* spp. in dorsal and lateral views. **a** *S. subflava* sp. n. **b** *S. bidentia* sp. n. **c** *S. quadrifasciata* sp. n. Scale: 1.0 mm.

Pronotum almost as wide as long, lateral keel invisible in dorsal view. Punctuation sparse and fine, as on head. Scutellum concealed.

Elytra longer than wide, widest at basal 1/6, gradually narrowed to apex, with minute serration at inner part of posterior margin. Punctuation coarser than on pronotum (Fig. 5e, f). Sutural striae extending outwards along basal margin to form basal striae, reaching humeral area and not joined with lateral striae.

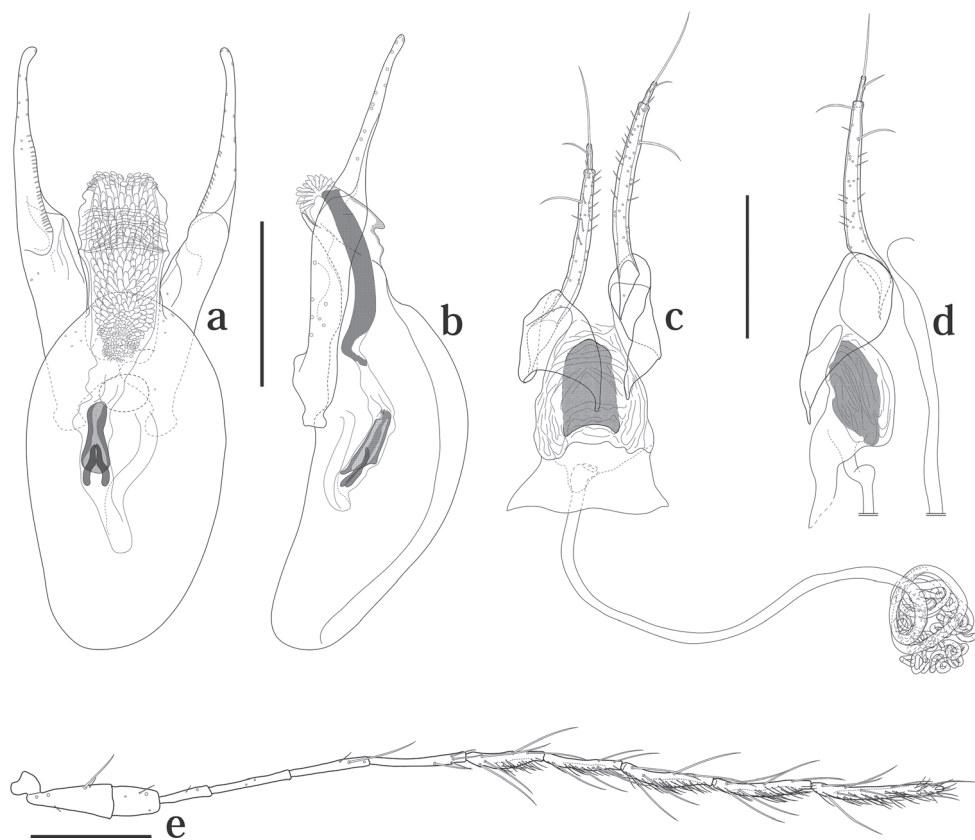
Propygidium densely and finely punctuate. Pygidium sparsely and finely punctuate, slightly emarginated at apex.

Hypomeron finely punctuate. Lateral portion of mesoventrite coarsely and sparsely punctuate; medial portion finely and sparsely punctuate, with fine pubescence. Lateral portion of metaventrite from base to basal 1/3 sparsely and coarsely punctuate, with apical portion moderately concave. Mesocoxa almost six times as wide as space between them; mesocoxal area moderately broadened. Metepimeron almost as long as wide, with microsculpture. Metacoxa about eight times as wide as metacoxal process. Metanepisternum about six times as long as wide. Lateral portion of ventrite I from base to basal 1/3 densely and coarsely punctuate. Ventrite VI strongly pointed at apicomedian portion.

Meso- and metafemora with microsculpture, sparsely and coarsely punctuate. Protarsomeres I–III and V each about two times as long as IV. Mesotarsomeres I about 1.2 times as long as II and III; V about 1.5 times as long as IV. Metatarsomeres I about 1.5 times as long as II and III; II and III each about 1.5 times as long as IV and V.

Male. Ventrite V strongly emarginated at apex. Protarsomeres I–III with tenent setae (Fig. 5b), enlarged. Aedeagus about 0.91 mm long; parameres asymmetrical; internal sac on basal portion covered with scale-like sclerites, and with a pair of sclerites (Fig. 2a).





**Figure 2.** Genitalia and antenna of *Scaphicoma subflava* sp. n. **a, b** Male genitalia; **c, d** female genitalia **e** male antenna. a, c, Dorsal view; b, d, lateral view. Scale: 0.25 mm.

Female. Ventrite V slightly emarginate or truncate. Protarsomeres I–III without tenent setae, not enlarged. Gonostylus elongate. Distal gonocoxite normal and elongate; vagina membranous, without robust sclerites; bursa copulatrix strongly sclerotized (Fig. 2c, d). Spermatheca as Fig. 2c.

**Measurements** (n = 6). Length (PL+EL): 2.55–2.75 mm; width (PW, EW): 1.04–1.13 mm, 1.09–1.21 mm. HW: 0.55–0.58 mm. ID: 0.16–0.19 mm. PL/PW: 0.95–1.07. EL/EW: 1.30–1.43. Approximate ratio of each antennal length (width) from base to apex as follows (n = 1): 1.7 (0.7) : 0.9 (0.6) : 1.0 (0.2) : 1.6 (0.2) : 1.5 (0.2) : 1.9 (0.2) : 1.5 (0.3) : 1.5 (0.2) : 1.7 (0.3) : 1.9 (0.3) : 2.5 (0.2).

**Specimens examined.** Holotype, 1 ♂, Mt. Tilongkabila (Gunung Tilongkabila), N. Sulawesi, alt. ca. 800m, 0°34'28.52N, 123°11'30.61E, 8. VI. 2012, R. Ogawa leg. (MZBI); Paratypes, 2♂2♀, Same data above (EUMJ); 1♂, Mt. Tilongkabila (Gunung Tilongkabila), N. Sulawesi, alt. ca. 800–1300 m, 0°34'28.52N–0°35'18.14N, 123°11'30.61E–123°13'22.71E, 9. VI. 2012, R. Ogawa leg. (HUOI); 1♂, Palu, Palopo, C. Sulawesi, 25–27. VIII. 1990, A. Riedel leg. (MHNG).

**Distribution.** Indonesia: northern and central Sulawesi.

**Etymology.** This specific name is the Latin *subflava* adjective meaning somewhat yellowish.

**Remarks.** This species was illustrated in Leschen and Löbl (2005), thought unidentified. It is very similar to the Javanese *Scaphicoma pallens* (Achard, 1921) by the body color and the shapes of male genitalia, but it is easily distinguished by the distinctive male genitalia with internal sac bearing sclerites.

***Scaphicoma bidentia* Ogawa & Löbl, sp. n.**

<http://zoobank.org/03705635-A4E6-4878-91A6-804E5EF413C8>

[http://species-id.net/wiki/Scaphicoma\\_bidentia](http://species-id.net/wiki/Scaphicoma_bidentia)

Figs 1b, 3

**Diagnosis.** Body dark reddish-brown. Body size relatively small. Antennomere XI about two times as long as VIII; IV and V each almost as VI. Protarsomeres I–III each about 1.2 times as long as IV; V about 1.7 times as long as IV. Mesotarsomeres I and V each about two times as long as II; III about 1.5 times as long as IV. Metatarsomeres I about 2.0 times as long as II; II and III each about 1.5 times as long as IV; V about 1.7 times as long as IV. Male and female sternite VII with middle of apical margin moderately concave. Paramere symmetrical, weakly enlarged at subapical portion. Internal sac with two-pronged spear shaped sclerite.

**Description.** Body shining. Head and mouthparts reddish-brown. Antenna yellowish-brown, except for antennomeres VI–XI dark yellowish-brown. Pronotum, elytra and ventral surface dark reddish-brown (Fig. 1b). Legs, propygidium and pygidium yellowish-brown. Head, pronotum and elytra sparsely and finely pubescent.

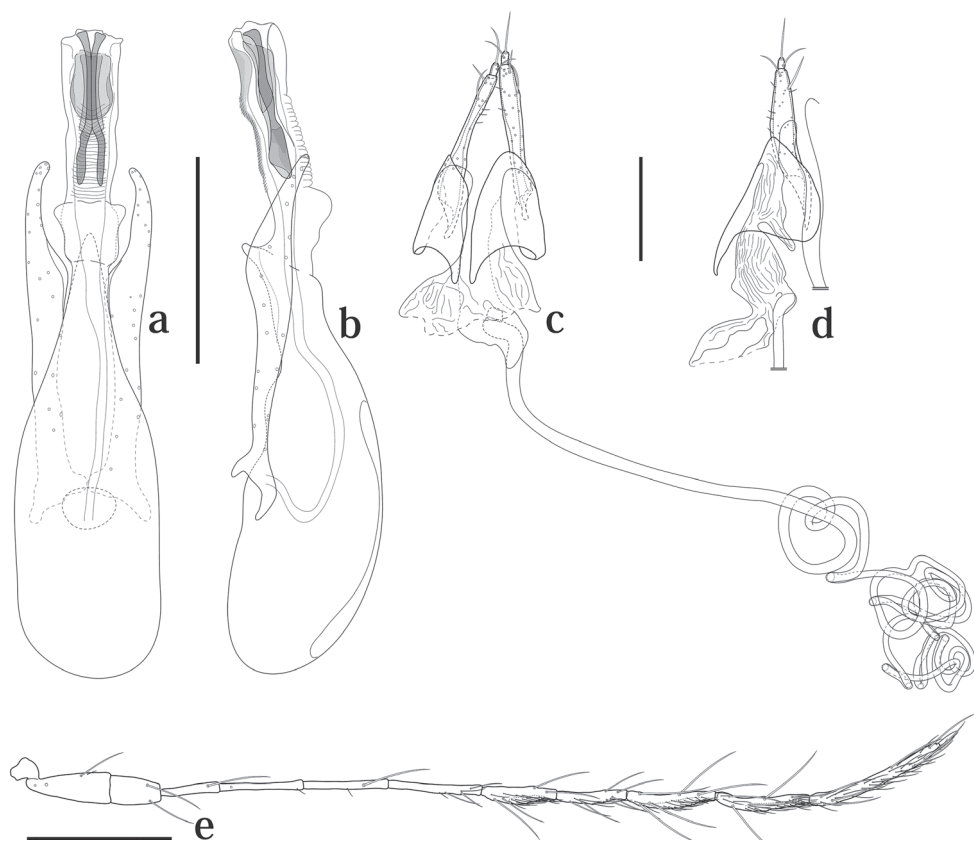
Head with interocular distance almost as eye width. Punctuation sparse and fine. Antennomeres I–VI with a few macrosetae, VII–XI covered with some microsetae; VI about 1.5 times as long as III; IV and V each almost as VI or shorter; VII almost as VIII or shorter; XI about two times as long as VIII (Fig. 3e).

Pronotum almost as wide as long, lateral keel invisible in dorsal view. Punctuation sparse and fine, as on head. Scutellum concealed.

Elytra longer than wide, widest at basal 1/6, gradually narrowed to apex, with minute serration at inner part of posterior margin. Punctuation coarser than on pronotum. Sutural striae extending outwards along basal margin to form basal striae, reaching humeral area and not joined with lateral striae.

Propygidium and pygidium sparsely and finely punctuate.

Hypomeron finely punctuate. Lateral portion of mesoventrite coarsely and sparsely punctuate; medial portion finely and sparsely punctuate, with fine pubescence. Lateral portion of metaventrite from base to basal 1/3 sparsely and coarsely punctuate, with apical portion moderately concave. Mesocoxa almost six times as wide as space between them; mesocoxal area moderately broadened. Metepimeron almost as long as wide, with microsculpture. Metacoxa about eight times as wide as metacoxal process.



**Figure 3.** Genitalia and antenna of *Scaphicoma bidentia* sp. n. **a, b** Male genitalia **c, d** female genitalia **e** male antenna. **a, c** Dorsal view; **b, d** lateral view. Scale: 0.25 mm.

Metanepisternum about six times as long as wide. Lateral portion of ventrite I from base to basal 1/3 densely and coarsely punctuate. Ventrite V emarginated at apex. Ventrite VI strongly pointed at apicomedian portion.

Meso- and metafemora with microsculpture, sparsely and coarsely punctuate. Protarsomeres I–III each about 1.2 times as long as IV; V about 1.7 times as long as IV. Mesotarsomeres I and V each about two times as long as II; III about 1.5 times as long as IV. Metatarsomeres I about 2.0 times as long as II; II and III each about 1.5 times as long as IV; V about 1.7 times as long as IV.

Male. Protarsomeres I–III with tenent setae, enlarged. Aedeagus about 0.62 mm long; parameres symmetrical; internal sac with two-pronged spear shaped sclerite (Fig. 3a).

Female. Protarsomeres I–III without tenent setae, not enlarged. Gonostylus robust. Distal gonocoxite normal, robust in lateral view; vagina membranous, without robust sclerites; bursa copulatrix not sclerotized (Fig. 3c, d). Spermatheca as Fig. 3c.

**Measurements** (n = 3). Length (PL+EL): 2.25–2.44 mm; width (PW, EW): 0.89–0.94 mm, 0.93–0.98 mm. HW: 0.46–0.53 mm. ID: 0.16–0.19 mm. PL/PW:

1.00–1.20. EL/EW: 1.42–1.45. Approximate ratio of each antennal length (width) from base to apex as follows ( $n = 1$ ): 1.4 (0.5) : 0.9 (0.5) : 1.0 (0.2) : 1.4 (0.2) : 1.4 (0.2) : 1.6 (0.2) : 1.3 (0.3) : 1.2 (0.2) : 1.5 (0.3) : 1.6 (0.2) : 2.4 (0.2).

**Specimens examined.** Holotype, 1♂, Mt. Tilongkabila (Gunung Tilongkabila), N. Sulawesi, alt. ca. 500–800 m, 0°34'04.62N–0°34'28.52N, 123°11'15.42E–123°11'30.61E, 26–27. I. 2011, R. Ogawa leg. (MZBI); Paratypes, 1♀, same data above (EUMJ); 1♀, Mt. Tilongkabila (Gunung Tilongkabila), N. Sulawesi, alt. ca. 800–1300 m, 0°34'28.52N–0°35'18.14N, 123°11'30.61E–123°13'22.71E, 9.VI. 2012, R. Ogawa leg. (HUOI).

**Distribution.** Indonesia: northern Sulawesi.

**Etymology.** This specific name is derived from the Latin *bidentia* (two-pronged), referring to the shape of sclerites of the internal sac.

**Remarks.** This species is very similar to the Philippines *Scaphicoma pullex* (Heller, 1917) by the body color and size, and it is also very similar to *Scaphicoma cincta* (Pic, 1920) from Sumatra by the shape of internal sac of the aedeagus. However, *S. pullex* is easily distinguished from the new species by the Y-shaped sclerite of internal sac and *S. cincta* is also easily distinguished from the new species by the color of elytra and pronotum with black along the edges.

***Scaphicoma quadrifasciata* Ogawa & Löbl, sp. n.**

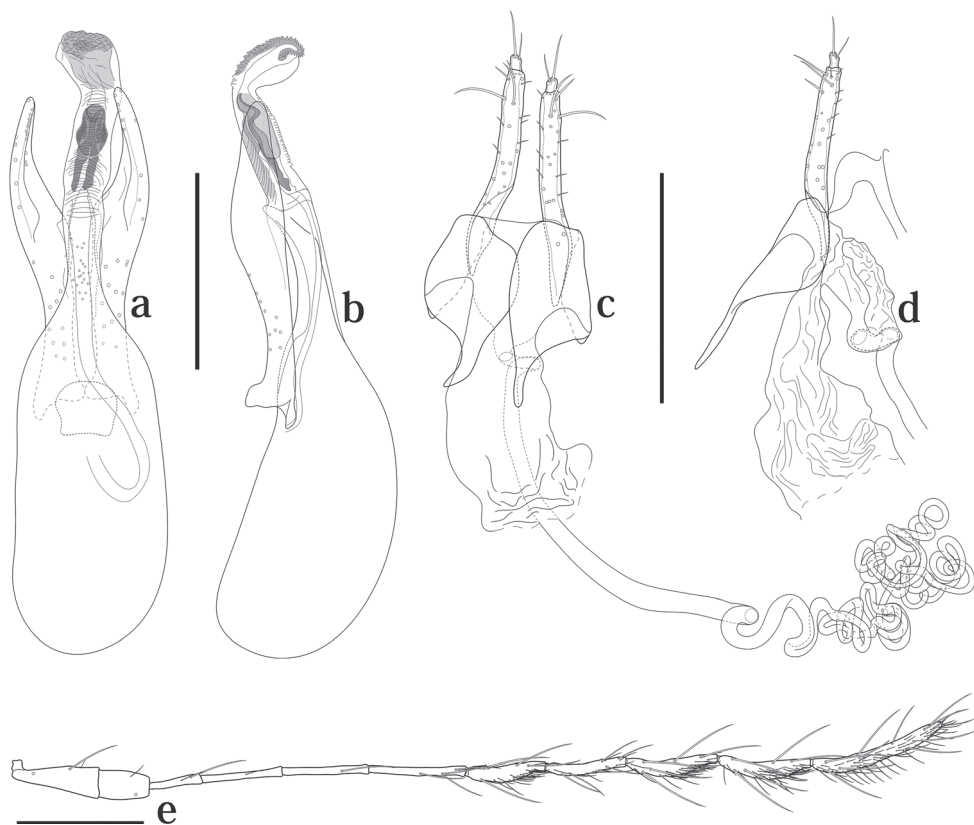
<http://zoobank.org/0450A718-3766-49A6-9D86-BAB2D5A5FC8E>

[http://species-id.net/wiki/Scaphicoma\\_quadrifasciata](http://species-id.net/wiki/Scaphicoma_quadrifasciata)

Figs 1c, 4

**Diagnosis.** Body bicolorous: basic color yellowish-brown, elytra each with black fasciae and black along sutural and lateral margins. Ventral surface with iridescent luster due to microsculptures. Antennomere VI about two times as long as III; IV and V each shorter than VI; XI about 1.6 times as long as VIII. Protarsomeres I–III and V about two times as long as IV. Mesotarsomeres I about 1.8 to 2.0 times as long as II; II, III and V each about 1.2 times as long as IV. Metatarsomeres I about 1.5 to 1.7 times as long as II; II and III each about 1.2 times as long as IV and V; IV almost as long as V. Parameres enlarged at subapical portion and tapering to apex, weakly pointed around subapical portion in dorsal view.

**Description.** Body shining. Head, mouthparts and antenna yellowish-brown, except for antennomeres VII–XI dark yellowish-brown. Basic color of dorsal surface yellowish-brown, pronotum ochraceous or darkened on disc, black along margins. Elytra each with two black fasciae and black along suture and lateral margins (Fig. 1c). Posterior margins of anterior fasciae extended to apex along sutural striae, not reaching to sutural striae. Posterior fasciae extended to apex, reaching to sutural striae. Propygidium and pygidium from in basal half black, pygidium from mid-length to apex brown. Ventral surface almost black and with iridescent luster due to microsculptures. Coxa, ventrite I and II and femora, tibiae and tarsi yellowish-brown. Head, pronotum and elytra sparsely and finely pubescent.



**Figure 4.** Genitalia and antenna of *Scaphicoma quadrifasciata* sp. n. **a, b** Male genitalia **c, d** female genitalia **e** female antenna. **a, c** Dorsal view; **b, d** lateral view. Scale: 0.25 mm.

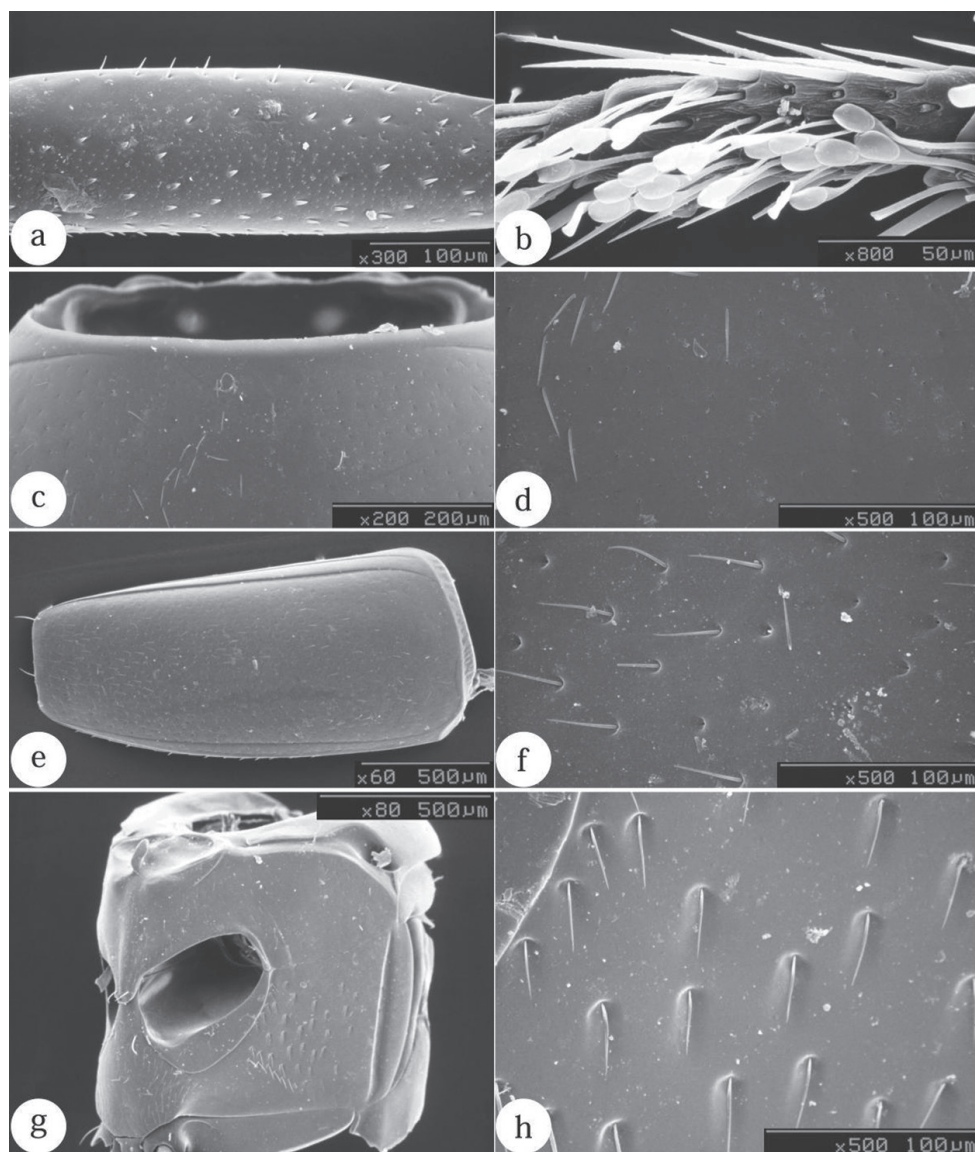
Head with interocular distance almost as eye width. Punctuation sparse and fine. Antennomeres I–VI with a few macrosetae, VII–XI covered with some microsetae; VI about two times as long as III; IV and V each shorter than VI; VII almost as VIII; XI about 1.6 times as long as VIII (Fig. 4e).

Pronotum almost as wide as long, lateral keel invisible in dorsal view. Punctuation sparse and fine, as on head. Scutellum concealed.

Elytra longer than wide, widest at basal 1/6, gradually narrowed to apex, with minute serration at inner part of posterior margin. Punctuation coarser than on pronotum. Sutural striae extending outwards along basal margin to form basal striae, reaching humeral area and not joined with lateral striae.

Propygidium sparsely and coarsely punctuate. Pygidium with sparse, fine and also coarse punctures.

Hypomeron finely punctuate. Lateral portion of mesoventrite coarsely and sparsely punctuate; medial portion finely and sparsely punctuate, with fine pubescence. Lateral portion of metaventrite from base to basal 1/3 sparsely and coarsely punctuate, with apical portion moderately concave. Mesocoxa almost six times as wide as space be-



**Figure 5.** SEM photographs of a male of *Scaphicoma subflava* sp. n. **a** Profemur **b** tarsonomere III **c** anterior portion of pronotum **d** disc of pronotum **e** elytra **f** disc of elytra **g** meso- and metaventricle in oblique angle **h** lateral portion of metaventricle. **a, c–f** Dorsal view; **g, h** ventral view.

tween them, mesocoxal area moderately broadened. Metanepisternum about six times as long as wide. Metepimeron almost as long as wide, with microsculptures. Metacoxa about eight times as wide as metacoxal process. Lateral portion of ventrite I from base to basal 1/3 densely and coarsely punctuate. Ventrite V moderately emarginated at apex. Ventrite VI strongly pointed at apical median portion.



Meso- and metafemora with microsculpture, sparsely and coarsely punctate. Protarsomeres I–III and V each about two times as long as IV. Mesotarsomeres I about 1.8 to 2.0 times as long as II; II, III and V each about 1.2 times as long as IV. Metatarsomeres I about 1.5 to 1.7 times as long as II; II and III each about 1.2 times as long as IV and V; IV almost as long as V.

Male. Protarsomeres I–III with tenent setae, weakly enlarged. Aedeagus about 0.6 mm long; parameres symmetrical, enlarged at subapical portion, tapering to apex, weakly pointed around subapical portion in dorsal view; internal sac with two-pronged spear shaped sclerite, fine scale-like and denticulate structures (Fig. 4a).

Female. Protarsomeres I–III without tenent setae, not enlarged. Ovipositor simple; bursa copulatrix not sclerotized (Fig. 4c, d). Spermatheca as Fig. 4c.

**Measurements** (n = 5). Length (PL+EL): 2.47–2.59 mm; width (PW, EW): 1.00–1.03 mm, 1.09–1.10 mm. HW: 0.51–0.54 mm. ID: 0.18–0.21 mm. PL/PW: 0.95–0.99. EL/EW: 1.36–1.46. Approximate ratio of each antennal length (width) from base to apex as follows (n = 1): 1.6 (0.6) : 1.0 (0.6) : 1.0 (0.2) : 1.6 (0.2) : 1.7 (0.2) : 1.9 (0.2) : 1.5 (0.3) : 1.6 (0.2) : 1.7 (0.3) : 1.8 (0.3) : 2.6 (0.3).

**Specimens examined.** Holotype, 1♂, Mt. Tilongkabila (Gunung Tilongkabila), N. Sulawesi, alt. ca. 1300 m, 0°35'18.14N–123°13'22.71E, 10. VI. 2012, R. Ogawa leg. (MZBI); Paratypes, 1♂1♀, Mt. Tilongkabila (Gunung Tilongkabila), N. Sulawesi, alt. ca. 800–1300 m, 0°34'28.52N–0°35'18.14N, 123°11'30.61E–123°13'22.71E, 9. VI. 2012, R. Ogawa leg. (EUMJ); 1♂1♀, same data above (HUOI).

**Distribution.** Indonesia: northern Sulawesi.

**Etymology.** This specific name is derived from the Latin *quadri* (four) and *fasciata* (band), referring to the four black elytral bands.

**Remarks.** This species is very similar to *Scaphicoma nigrovittata* (Achard, 1921) and *Scaphicoma flavovittata* Motschulsky, 1863 from Sri Lanka by the distinctly bi-colourous body. However, both may be distinguished from the new species by the almost black venter of body, the subapically enlarged parameres and by the shape of the sclerites of the internal sac.

## Discussion

Sulawesi is considered to have been formed by the collision of three continental plates, from which derive Sundaland (including Borneo, Sumatra and Java), the Philippines and Australia (e.g. Spakman and Hall 2010). Therefore, the fauna of northern Sulawesi is assumed to be associated with that of Sundaland and the Philippines (Michaux 2010, Stelbrink et al. 2012). Indeed, two Sulawesi species of beetle, *S. subflava* and *S. bidentia*, have closely related congeners in Java and the Philippines, respectively. In contrast, *S. quadrifasciata* is probably related to congeners from Sri Lanka. Thus its ancestors may have drifted east-wards on ocean current. As there are still many gaps in our knowledge of *Scaphicoma*, further research is needed to gain a better understanding of the relationships and origins of the Sulawesi species.



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# A revision of Japanese species of the genus *Psammoecus* Latreille (Coleoptera, Silvanidae)

Takahiro Yoshida<sup>1,†</sup>, Toshiya Hirowatari<sup>2,‡</sup>

**1** Entomological Laboratory, Graduate School of Bioresource and Bioenvironmental Sciences, Kyushu University, Fukuoka, 812–8581 Japan **2** Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka, 812–8581 Japan

† <http://zoobank.org/0EFE7022-0772-4365-9DB4-85B60AEE334A>

‡ <http://zoobank.org/E252B891-0353-4F5F-B58A-D06AAB7CC253>

Corresponding author: Takahiro Yoshida (yoshida\_toritoma@yahoo.co.jp)

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## Abstract

Japanese species of the genus *Psammoecus* Latreille, 1829 are taxonomically revised. Four new species, *P. scitus* **sp. n.** (misidentified with *P. quadrimaculatus*), *P. labyrinthicus* **sp. n.**, *P. boreas* **sp. n.** and *P. omotoensis* **sp. n.** are described. *Psammoecus bipunctatus* (Fabricius, 1792), *P. trimaculatus* Motschulsky, 1858 (misidentified with *P. triguttatus*), *P. simoni* Grouvelle, 1892, *P. fasciatus* Reitter, 1874 and *P. triguttatus* are redescribed. Another described species whose distribution in Japan is questionable. *P. quadrimaculatus* is also redescribed. Lectotype and paralectotype of *P. fasciatus* and *P. triguttatus* are designated.

## Keywords

Taxonomy, Cucujoidea, Japan, four new species, misidentification, redescription, taxonomic key

## Introduction

The family Silvanidae Kirby 1837 (Coleoptera, Cucujoidea) includes two subfamilies and about 58 genera, approximately 500 species (Thomas and Leschen 2010) and is found around the world: 39 species have been recorded from Japan. The Silvanidae are considered to be fairly primitive among the Cucujoidea (Thomas 2002). Most members of the Silvanidae seem to be fungivorous, and share the character of a large pit for fungal transport called the “mycangium” on each mandible (Thomas 2002). However, Grebennikov and Leschen (2010) stated that these mycangial functions in the Silvanidae had not been verified experimentally. The Silvanidae contain some harmful pests of stored grains and grain products (e.g. *Ahasverus advena* (Waltl, 1834), *Oryzaephilus surinamensis* (Linnaeus, 1758) and *Silvanus lewisi* Reitter, 1876) (Halstead 1986). Some of these species are occasionally transferred with goods in transit and distributed over the world.

The genus *Psammoecus* Latreille, 1829 (Brontinae, Telephanini) includes about 80 described species and is the second largest genus in the Silvanidae (Thomas and Leschen 2010). Species belonging to *Psammoecus* were recorded only from the Old World for many years, but one species, *Psammoecus trimaculatus* Motschulsky, 1858 was found in Brazil recently (Thomas and Yamamoto 2007). In Japan, six described species and four undescribed species of *Psammoecus* were reported by Hirano (2009) and Hirano (2010). Pal (1985) carried out a historical review of *Psammoecus* in detail and concluded that *Psammoecus* belongs to the tribe Psammocini of the subfamily Psammocinae. Thomas and Nearn (2008) stated that the correct name of the tribe is Telephanini and that the Psammocinae should be named Brontinae according to the principle of priority, and Karner (2012) followed this treatment. Lu and Han (2006) reported that *Psammoecus triguttatus* Reitter, 1874 had been transferred with leather and its packages in transit from China. Therefore, the species belonging to *Psammoecus* have a potential as important pests and alien species.

The species of *Psammoecus* are found in plant detritus and they are sometimes attracted to light (Karner 2012), but there is little information on their ecology. In addition, taxonomic studies of *Psammoecus* are also insufficient and confused, probably for the following reasons: 1) most *Psammoecus* species were described very early historically; 2) their coloration and the black maculae on the elytra are very variable (e.g. Kreissl 1976; Yoshida and Hirowatari 2013); 3) there are no more than three studies containing descriptions of the genital structures (Pal 1985; Karner 2012; Yoshida and Hirowatari 2013) which provide very useful characters for taxonomic study of the genus (Karner 2012); 4) their body sizes are relatively small, ranging from 1.8 mm to 3.6 mm. In Japan, the classification of *Psammoecus* has also been confused. For example, Hirano (2009) and Hirano (2010) reported four undescribed species from Japan and stated that the species illustrated as *P. triguttatus* by Nakane (1963) seemed to be an undescribed species. In addition, Hirano (2009) and Hirano (2010) suspected the authenticity of records of *P. trimaculatus* from

Japan. Recently, Yoshida and Hirowatari (2013) added a new species, *P. hiranoi*, to the Japanese fauna.

As stated above, taxonomy of this genus involves many problems and it has a potential to provide important pests and alien species. Hence, the authors here review the classification of Japanese *Psammoecus* by comparison of morphological characters and seek to resolve the taxonomic problems.

## **Materials and methods**

### **Observation of morphology and dissection and photographic technique**

External characters were observed under a stereoscopic microscope (Olympus SZX10). Genital structures were placed on a cavity slide glass with 50% glycerol solution and observed with an optical microscope (Nikon Eclipse E400). The genitalia slide was prepared in the following steps: the removed abdomen was placed in a 200 µl PCR tube filled with 10% solution of potassium hydroxide (KOH) and kept in heated water for about seven minutes. After rinsing in 70% ethanol solution, the abdomen was dissected by cutting its side using fine insect pins. The genitalia were removed and transferred to a cavity slide glass with 50% glycerol solution for observation. After the observation, the genitalia and the abdomen were mounted in Euparal on cover glasses each glued to a piece of cardboard, and pinned with the specimens.

Photographs were taken with digital camera (Canon EOS 7D), and composite images were produced using automontage software Combine ZM. These images were retouched using Photoshop 6.0 (Adobe Systems Inc.)

### **Terminology, abbreviations and specimen deposition**

Technical terms of genital structures follow Lawrence et al. (2010) and Lawrence et al. (2011). Morphological abbreviations are as follows: BL – body length from anterior margin of clypeus to apex of elytra measured along the median line; PL – length of pronotum measured along the median line; PW – greatest width of pronotum including lateral teeth; EW – greatest width of elytra; HL – head length from base to anterior margin of clypeus; HW – head width across eyes; IE – width of distance between eyes.

Depositories of the examined specimens are in the Ehime University Museum, Matsuyama (EUMJ), the Natural History Museum, London (BMNH), the Osaka Museum of Natural History, Osaka (OMNH), the Systematic Entomology, Hokkaido University, Sapporo (SEHU), Isamu Tanaka Collection, Nishinomiya (ITC), Yukihiro Hirano Collection, Odawara (YHC) and the Entomological Laboratory, Kyushu University, Fukuoka (ELKU).

## Results and discussion

### Taxonomy

#### *Psammoecus scitus* sp. n.

<http://zoobank.org/EEAFC47C-A1E6-4E6F-B4CF-0F099AE6686F>

[http://species-id.net/wiki/Psammoecus\\_scitus](http://species-id.net/wiki/Psammoecus_scitus)

Japanese name: Yotsumon-semaru-hiratomushi

Figs 1A, 3 and 13A–C

*Psammoecus quadrimaculatus*: Hirano 2009: 64, 65, 82, fig. 4. – Hirano 2010: 12, 14. (misidentification)

**Diagnosis.** This species is similar to *Psammoecus hiranoi* Yoshida & Hirowatari, 2013, especially in darker specimens. However they can be distinguished by the ventral shape of the head. The temples of this species are immediately narrowed behind eyes, while those of *P. hiranoi* are widened behind the eyes and gradually narrowed toward the anterior margins.

**Description.** **Body length.** 2.65–3.26 mm (n=48).

**Coloration** (Fig. 1A). Head and pronotum yellowish-brown to reddish-brown. Elytra black with yellowish-brown maculae; horizontal band at anterior 1/4, sometimes enlarged toward bases of elytra, round maculae at posterior 1/4, connected to lateral margins. Antennae yellowish-brown basally, 6th antennomere darker, 7th to 10th blackish-brown, 11th (apex) very bright.

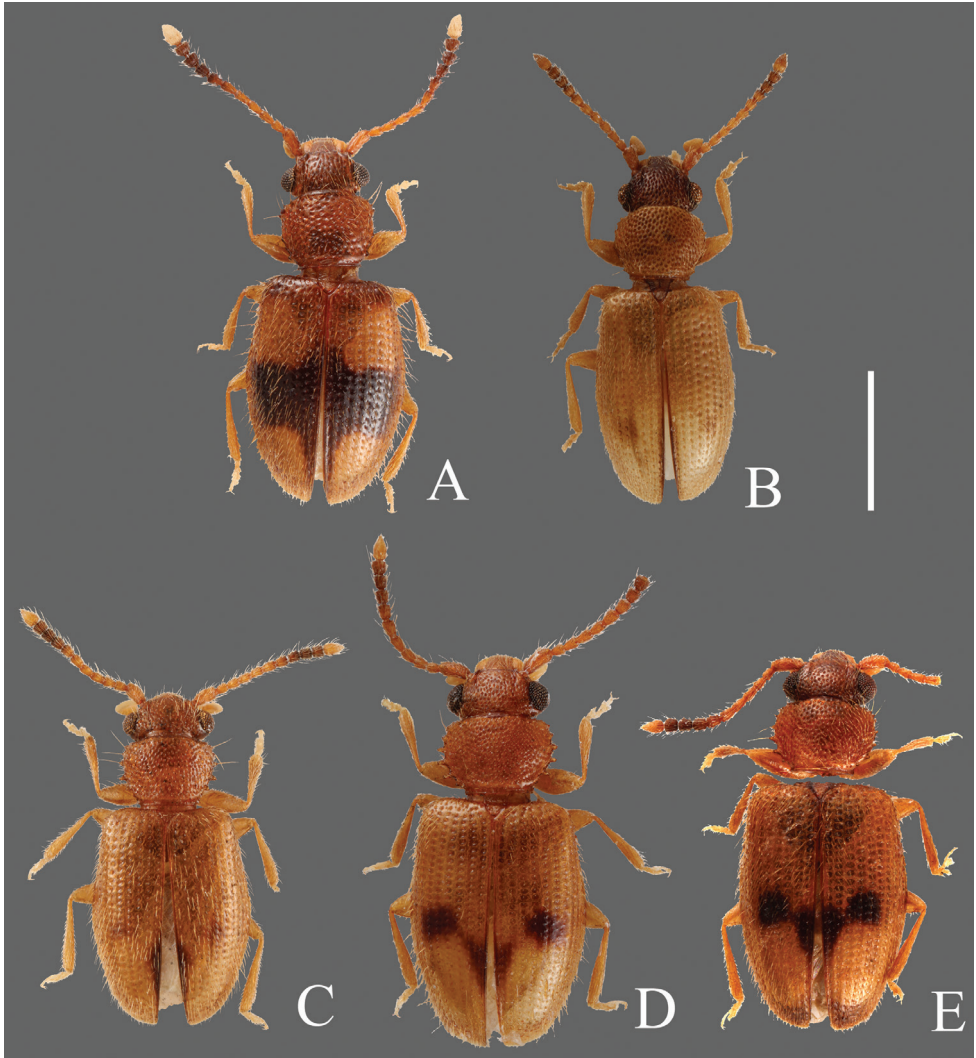
**Head** (Fig. 3A, B, C). Broad, HW/HL 1.31–2.00; IE/HL 0.87–1.30. Temples immediately narrowed behind eyes, slightly incised at bases. Dorsal surface with comparatively coarse punctuation, ventral surface with very sparse punctures. Antennae 1.40–1.43 mm long, slender; covered relatively sparsely with long erect pubescence on each antennomere; approximate ratio of antennomeres of holotype as follows: 2.5 : 1.1 : 1.2 : 1.3 : 1.3 : 1.3 : 1.1 : 1.2 : 1.2 : 1.0 : 2.0 (Fig. 3A).

**Pronotum** (Figs 3B, C). Subquadrate, PW/PL 1.14–1.32. Punctuation on dorsal surface comparatively sparse, punctuation on ventral surface sparser than on dorsal surface. Pubescence composed of many short setae, and long setae on teeth on lateral margins and anterior and posterior angles. Anterior angles with a few very small protrusions, lateral margins with several small teeth, these teeth variable, slightly longer on lateral margins around anterior and posterior angles, and each posterior angle with very small teeth.

**Elytra** (Fig. 3E). Elongate-oval, EW/BL 0.38–0.51. Rows of punctures narrower than interstices. Pubescence composed of many semi-long medium length setae, and some long erect setae in a row around lateral margins, longer toward anterior portion.

**9th abdominal sternite** (Fig. 13A). Strut very long, narrow, cut at anterior 3/8, diverging gradually at posterior 1/8, branches comparatively small. Lateral sclerites elongate with small sclerites attached around posterior apical portion.

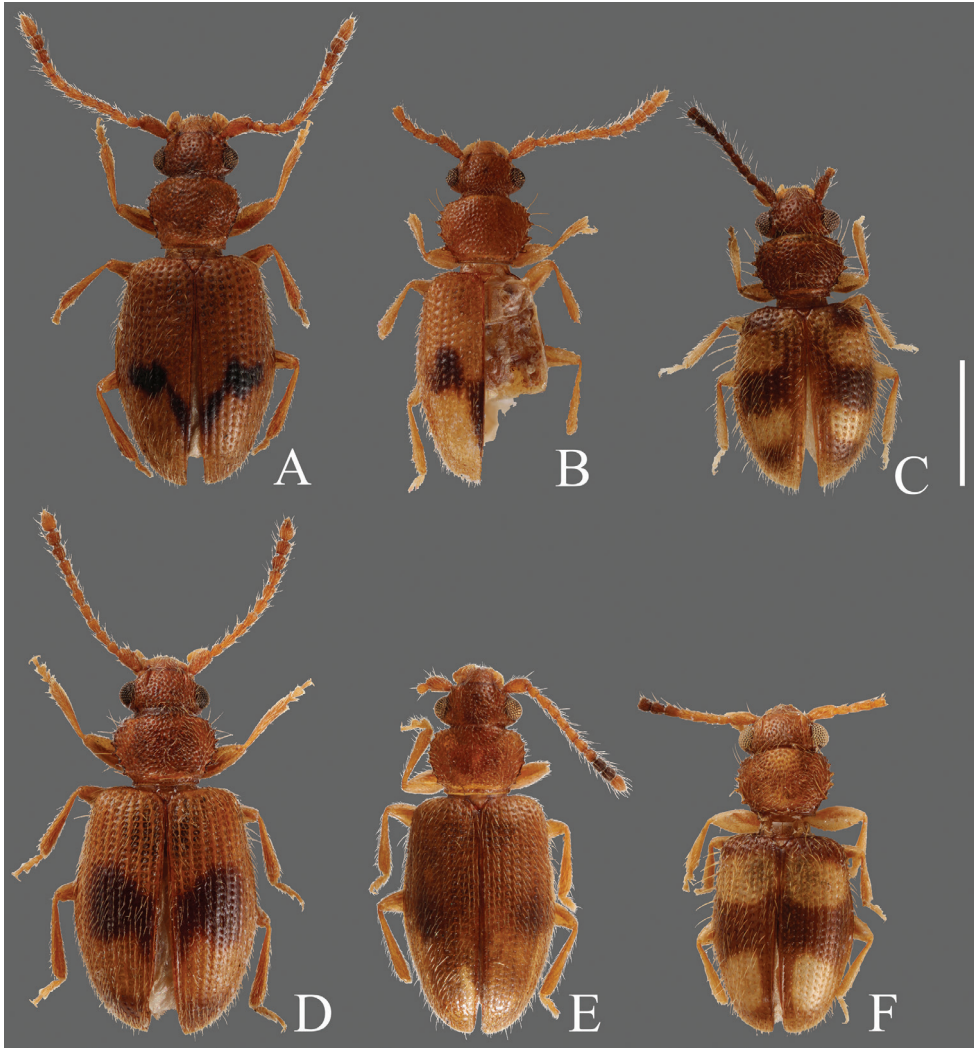




**Figures 1.** Habitus of *Psammoecus* spp. **A** *Psammoecus scitus* sp. n., holotype **B** *Psammoecus bipunctatus* (Fabricius, 1792) **C** *Psammoecus trimaculatus* Motschulsky, 1858 **D** *Psammoecus triguttatus* Reitter, 1874, lectotype **E** *Psammoecus labyrinthicus* sp. n., holotype. Scale: 1.0 mm.

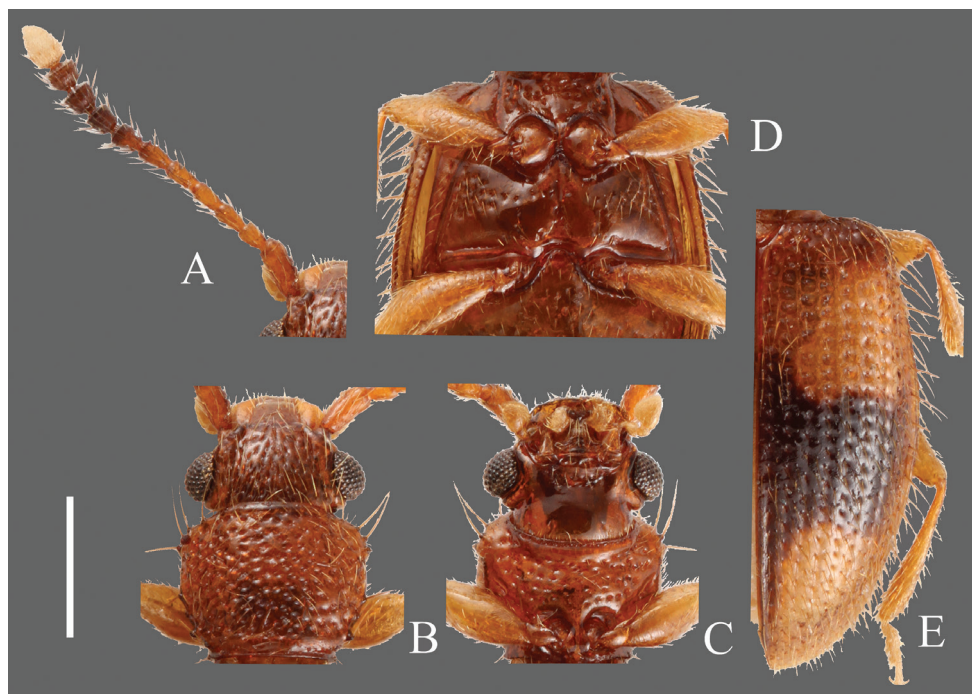
**Aedeagus** (Fig. 13B, C). Parameres broad, depressed at base, narrowed on inner margins in posterior half, incised around apex, punctuated very sparsely, a few long setae around apex, several short setae on lateral margins and posterior half of inner margins. Phallobase diverging in anterior half, each branch twisted at anterior 1/4. Penis relatively elongate, curved dorsally before apex.

**Type series.** Holotype: male, Kûra, Ishigaki Island, Okinawa Prefecture, Japan, 22–IX–2012, T. Yoshida leg. (EUMJ). Paratypes: [Kagoshima Pref.] 1 ex., Honcha, Amami-Ôshima Island, 23–VII–1962, N. Ohbayashi leg. (EUMJ); 1 ex., Nadakawa,



**Figures 2.** Habitus of *Psammoecus* spp. **A** *Psammoecus boreas* sp. n., holotype **B** *Psammoecus omotoensis* sp. n., holotype **C** *Psammoecus simoni* Grouvelle, 1892 **D** *Psammoecus fasciatus* Reitter, 1874, lectotype **E** *Psammoecus hiranoi* Yoshida & Hirowatari, 2013 **F** *Psammoecus quadrimaculatus* Reitter, 1874, holotype. Scale: 1.0 mm.

Amami-Ôshima Island, 16–VII–1962, N. Ohbayashi leg. (EUMJ); 1 ex., Kamiya, Amami-Ôshima Island, 4–XI–1984, M. Tomokuni leg. (EUMJ). [Okinawa Pref.] 1 ex., Hiji, Kunigami Village, Okinawa Island, 15–20–VI–1994, K. Okada leg. (EUMJ); 1 male & 1 female, Takazato, Kunigami Village, Okinawa Island, 18–22–VI–2003, I. Tanaka leg. (ITC); 2 exs., Inamine, Nago City, Okinawa Island, 26–IX–2012, T. Yoshida leg. (ELKU); 1 ex., Shokubutsuen, Miyako Island, 3–III–1999, T. Mizoguchi leg. (EUMJ); 1 female, Kûra, Ishigaki Island, 22–IX–2012, T. Yoshida leg. (ELKU); 4 exs., Ôura Dam, Ishigaki Island, 7–X–2013, R. Itô leg. (ELKU); 2 exs., Mt. Yarabu-dake, Ishigaki



**Figures 3.** *Psammoecus scitus* sp. n., holotype, male. **A** Left antenna **B** head and pronotum of dorsal view **C** head and pronotum of ventral view **D** metaventricle **E** right elytron with rows of punctures and pubescence. Scale: 0.5 mm.

Island, 26–III–2000, T. Kurihara leg. (EUMJ); 7 exs., same locality, 16–VI–2002, T. Watanabe leg. (ELKU); 5 exs., same locality, 8–X–2013, R. Itô leg. (ELKU); 1 male, same locality, 8–III–2006, I. Tanaka leg. (ITC); 1 female, Kabira, Ishigaki Island, 19–IV–2010, I. Tanaka leg. (ITC); 2 exs., Takeda Rindô, Ishigaki Island, 14–III–1999, T. Mizoguchi leg. (EUMJ); 2 exs., same locality, 16–VI–2002, T. Watanabe leg. (ELKU); 2 exs., same locality, 22–IX–2012, T. Yoshida leg. (ELKU); 6 exs., same locality, 23–IX–2012, T. Yoshida leg. (ELKU); 3 exs., Funaura, Iriomote Island, 18–III–2008, S. Yamamoto leg. (ELKU); 1 ex., Urauchi-gawa, Iriomote Island, 2–VII–1994, K. Okada leg. (EUMJ); 3 exs., Komi, Iriomote Island, 20–III–2008, S. Yamamoto leg. (ELKU); 1 ex., Ôtomi Rindô, Iriomote Island, 13–III–1999, T. Mizoguchi leg. (EUMJ); 1 ex., Mt. Inbi-dake, Yonaguni Island, 31–III–2009, S. Yamamoto leg. (ELKU).

**Distribution.** JAPAN: Amami-Ôshima, Okinawa, Miyako, Ishigaki, Iriomote and Yonaguni Islands.

**Biological notes.** This species is found in piled dead leaves such as Japanese pampas grass *Miscanthus sinensis* Andersson, Banana *Musa* sp. and some other kinds of broad-leaved tree. This species is most common in the Nansei Islands.

**Etymology.** The specific name means ‘pretty’ and ‘beautiful’. This new species has vivid coloration.

**Remarks.** *Psammoecus scitus* sp. n. has been misidentified as *P. quadrimaculatus* Reitter, 1874 for a long time. *Psammoecus quadrimaculatus* was originally described from ‘Japonia’ (=Japan) by Reitter (1874). Sato (1989) first gave the Japanese name ‘Yotsumon-semaru-hiratomushi’ to *P. quadrimaculatus*. Hirano (2009) and Hirano (2010) provided figures of this species as *P. quadrimaculatus*. However, examination of the holotype of *P. quadrimaculatus* deposited in BMNH revealed that external characters such as the shape of the teeth on the lateral margins of the pronotum and the male genital structure are distinctly different.

***Psammoecus bipunctatus* (Fabricius, 1792)**

[http://species-id.net/wiki/Psammoecus\\_bipunctatus](http://species-id.net/wiki/Psammoecus_bipunctatus)

[Japanese name: Futamon-semaru-hiratomushi]

Figs 1B, 4 and 13D–F

*Notoxus bipunctatus* Fabricius, 1792: 212. Type locality: Germania Dom.

*Latridius bipunctatus*: Herbst 1793: 10.

*Anthicus bipunctatus* Fabricius, 1801: 291.

*Psammoecus bipunctatus*: Latreille 1829: 135. – Schaufuss 1916: 457, fig. 4 in pl. 14. – Hetschko 1930: 81. (catalogue) – Halstead et al. 2007 – Hirano 2009: 63, 64, 82, fig. 3. – Hirano 2010: 11, 12.

*Psammaechus*[sic.] *bipunctatus*: Smith 1851: 15. (catalogue)

**Diagnosis.** This species is similar to *P. trimaculatus* and *P. boreas* sp. n., but can be distinguished from the former by the shorter teeth on the lateral margins of the pronotum and from the latter by the shorter body length and the shorter antennae.

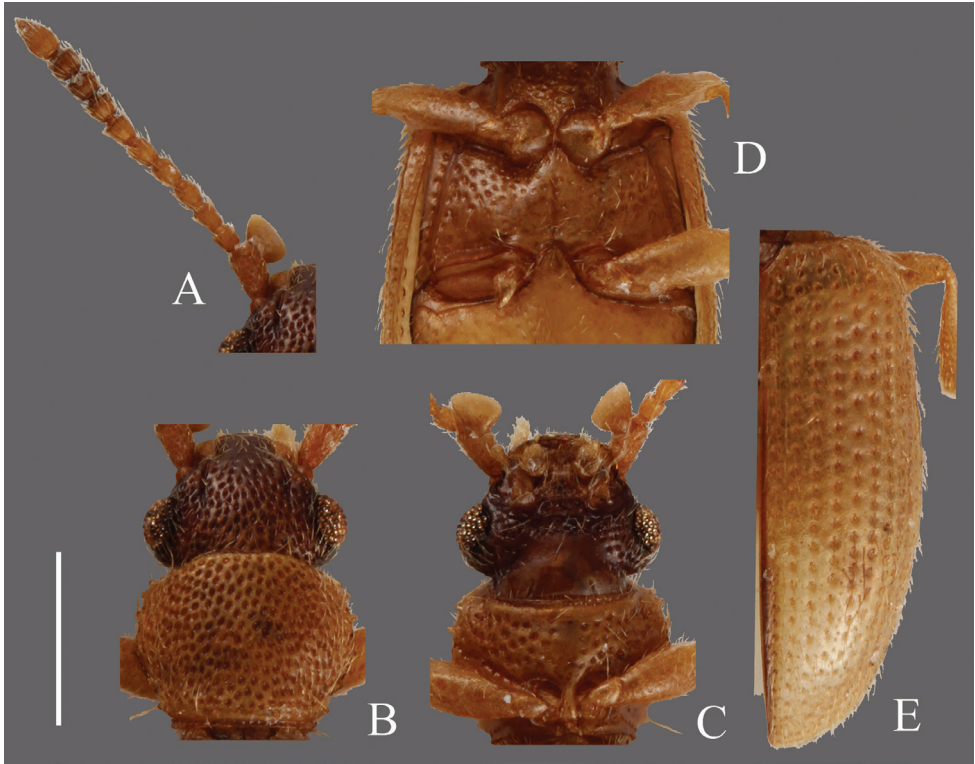
**Description.** **Body length.** 2.25–2.83 mm (n=9).

**Coloration** (Fig. 1B). Head dark brown, gradually darker toward anterior. Pronotum yellowish-brown to reddish-brown. Elytra yellowish-brown with round dark maculae on posterior 1/3, elytral suture dark in posterior half. Elytra of lighter colored specimens with reduced dark maculae and dark areas of elytral suture. Antennae yellowish-brown basally, 9th, 10th and posterior end of 8th antennomeres blackish-brown, 11th (apex) yellowish-brown.

**Head** (Fig. 4A, B, C). Triangular, HW/HL 1.55–2.06; IE/HL 1.03–1.33. Dorsal surface with strong dense punctures, temples and posterior ventral surface also with irregularly dense punctures. Temples well enlarged, immediately narrowing thereafter. Eyes prominent, relatively small. Antennae 1.09–1.20 mm, comparatively thick, short; covered with medium length erect pubescence on each antennomere; approximate ratio of one of examined specimens as follows: 2.6 : 1.1 : 1.2 : 1.1 : 1.2 : 1.2 : 1.1 : 1.0 : 1.1 : 1.0 : 1.8 (Fig. 4A).

**Pronotum** (Fig. 4B, C). Roundly subquadrate, PW/PL 1.16–1.24. Dorsal surface with strong moderately dense punctuation, denser than that on ventral surface; some punctures on ventral surface in rows. Pubescence composed of many short setae on dorsal surface and several medium length setae on each lateral margin, distance between medium length setae





**Figures 4.** *Psammoecus bipunctatus* (Fabricius, 1792), male specimen which genital structures were illustrated in this paper. **A** Left antenna **B** head and pronotum of dorsal view **C** head and pronotum of ventral view **D** metaventricle **E** right elytron with rows of punctures and pubescence. Scale: 0.5 mm.

approximately regular. Each anterior angle with several very small teeth, each lateral margin with four similarly sized small teeth, the distance between them irregular and variable; each posterior angle with a small tooth, similar in size to those on lateral margins.

**Elytra** (Fig. 4E). Elongate, EW/BL 0.36–0.47. Rows of punctures almost same width as interstices. Pubescence composed of numerous comparatively short setae, without long setae.

**9th abdominal sternite** (Fig. 13D). Strut Y-shaped, cut at anterior 1/3, diverging in posterior 1/4, branches relatively wide, ends of each branch pointed and curved inwards. Lateral sclerites elongate, membranous.

**Aedeagus** (Figs. 13E and F). Parameres club-shaped, wide and thick at bases, each apical portion with a long seta, stick-shaped portions with sparse punctuation and several short setae, lateral portions and inner margins of bases with successions of dense punctures, inner margin of bases with numerous short setae. Phallobase enlarged toward posterior margin from posterior 1/3, anterior margin roundly incised, anterior portion extended. Penis flat, wide, narrowed gradually toward apex, apical portion pointed, apical portion of dorsal part with sparse punctures.

**Specimens examined.** JAPAN: [Hokkaido Pref.] 1 male, Takkobu-numa Lake, Kushiro City, 1–IX–2006, T. Yoshida leg. (ELKU); 1 ex., Iwabokki, Kushiro City, 25–VIII–1990, M. Sakai leg. (EUMJ); 6 exs., same locality, 26–VIII–1990, M. Sakai leg. (EUMJ); 1 ex., same locality, 29–VIII–1990, M. Sakai leg. (EUMJ).

**Distribution.** JAPAN: Hokkaido; Africa; Europe; Russia; Turkestan.

**Biological notes.** This species is known to inhabit marshland. Warne (1963) reported that large numbers of this species were found on *Carex*.

**Remarks.** The habitat and distribution of this species are unusual in the genus *Psammoecus*. This species inhabits marshland and is distributed in comparatively high latitudes where species richness of *Psammoecus* is poor. Coloration is variable. In the past, four aberrations and two varieties (e.g. Lucas 1843; Gerhardt 1912) were described.

### *Psammoecus trimaculatus* Motschulsky, 1858

[http://species-id.net/wiki/Psammoecus\\_trimaculatus](http://species-id.net/wiki/Psammoecus_trimaculatus)

Japanese name: Mitsumon-semaru-hiratomushi

Figs 1C, 5 and 13G–I

*Psammaechus* [sic.] *trimaculatus* Motschulsky, 1858: *Etud. Ent.* 7: 45. Type locality: Sri Lanka; Type deposition: Zoological Museum, Moscow Lomonosov. (referring to Hetschko (1930))

*Psammoecus trimaculatus*: Waterhouse 1876: 124. – Reitter 1879: 509. – Grouvelle 1906: 125. – Grouvelle 1908: 476. – Hetschko 1930: 81. (catalogue) – Hisamatsu 1977: 21. – Hisamatsu 1982: 16. – Pal 1985: 41, Figs 15–29. – Sato 1989: 377. – Sasaki et al. 2002: 224. – Halstead et al. 2007 – Hirano 2009: 66. – Hirano 2010: 15. – Karner 2012: 24.

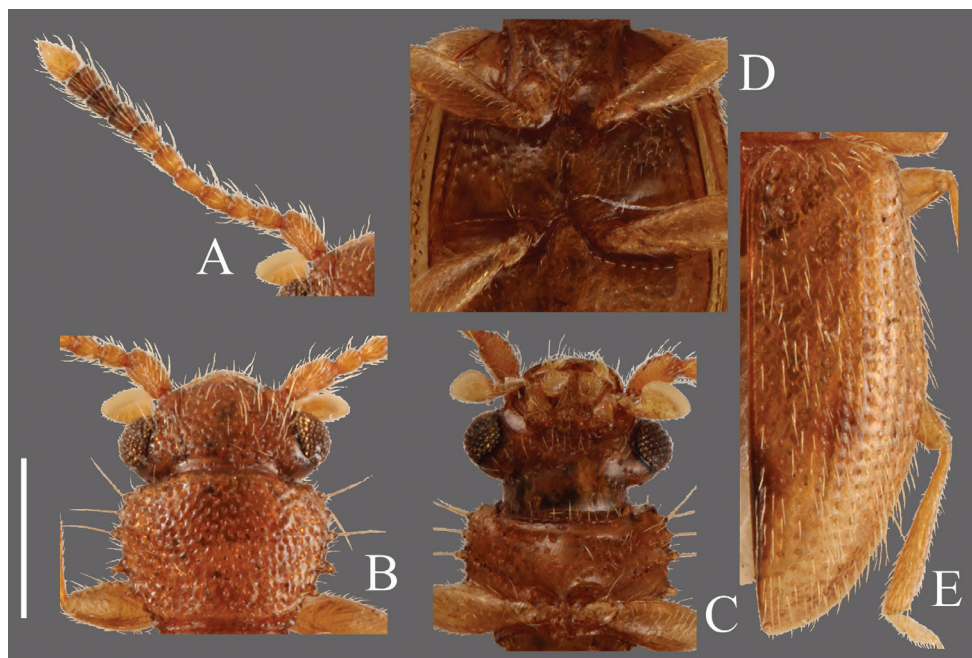
*Psammoecus triguttatus*: Hirano 2009: 64, 65, 66. – Hirano 2010: 12, 14. (misidentification)

**Diagnosis.** This species is closely similar to *P. triguttatus* and *P. labyrinthicus* sp. n. but it can be distinguished from the former by the larger basal parameres and the broader distance between the posterior margin of the phallobase and the deepest point of incision of the anterior margin of the phallobase, and from the latter by the larger bases of parameres and the wider protuberances on the inner margins of the branches of the anterior phallobase. The rows of punctures on the elytra of *P. trimaculatus* (Fig. 5E) are comparatively narrower than in these two closely similar species. However, their external characters, especially their coloration, are variable. These features may cause misidentification.

**Description. Body length.** 2.32–2.96 mm (n=38).

**9th abdominal sternite** (Fig. 13G). Strut Y-shaped, elongate, cut at anterior 3/8, diverging in posterior 1/5, branches relatively wide, narrowed gradually toward apex, ends of each branch curved inward. Lateral sclerites elongate, membranous.

**Aedeagus** (Fig. 13H, I). Parameres hatchet-shaped, inner margin around bases pointed, punctuated sparsely on stick-shaped portions, densely on anterior portions,



**Figures 5.** *Psammoecus trimaculatus* Motschulsky, 1858, male specimen which genital structures were illustrated in this paper. **A** Left antenna **B** head and pronotum of dorsal view **C** head and pronotum of ventral view **D** metaventricle **E** right elytron with rows of punctures and pubescence. Scale: 0.5 mm.

a long seta at each apex, numerous short setae on stick-shaped portions and around inner margins of anterior parts. Posterior margin of phallobase rounded, phallobase roundly hollowed, its anterior branches markedly protruding inward. Penis gradually narrowed toward apex, posterior 1/9 flattened, punctuated sparsely on posterior 1/9.

**Specimens examined.** India: [Andhra Pradesh State] 1 ex., Hyderabad, 18–X–1969, T. Ishihara leg. (EUMJ). JAPAN: [Hokkaido Pref.] 1 male, Suehiro, Asahikawa City, 18–IX–2013, T. Yoshida leg. (ELKU); 1 male, Aizankei, Kamikawa Town, 2–IX–1977, A. Oda leg. (EUMJ); 1 ex., Sôunkyo, Kamikawa Town, 4–IX–1977, A. Oda leg. (EUMJ); 1 ex., Chûbisei, Memuro Town, 25–VIII–1995, S. Hisamatsu leg. (EUMJ); 2 exs., Fushimi Marsh, Memuro Town, 25–VIII–1995, S. Hisamatsu leg. (EUMJ). [Aomori Pref.] 1 male, Namioka Ōaza Yoshinoda, Aomori City, 16–IX–2012, K. Ikeuchi leg. (ELKU). [Gifu Pref.] 1 male, Tentoku, Mizunami City, 31–VII–2009, K. Itô leg. (ELKU). [Hyogo Pref.] 1 male, Mt. Mikusa-yama, Inagawa Town, 27–VI–1991, K. Ikeuchi leg. (ELKU). [Wakayama Pref.] 2 males, 3 females & 7 exs., Biwadani, Kinokawa City, 25–IV–2012, T. Yoshida leg. (ELKU). [Kagawa Pref.] 1 male, Yoshima Island, Sakaide City, 10–12–IX–1973, S. Kinoshita leg. (EUMJ). [Tokushima Pref.] 2 males, 2 females & 4 exs., Kamojima-chô, Yoshinogawa City, 4–III–2012, T. Yoshida leg. (ELKU). [Kochi Pref.] 1 male, Godaisan-Park, Kochi City, 21–V–1983, K. Ishida leg. (EUMJ). [Fukuoka Pref.] 1 male, Kitano-chô, Kurume City, 1–VII–2013, T. Yoshida leg. (ELKU). [Kagoshima Pref.] 1 male, Kotoku-gawa, Amami-Ōshima Island, 14–III–1988, M. Satô leg. (EUMJ).



[Okinawa Pref.] 1 male, Yona, Kunigami Village, Okinawa Island, 17–VII–1965, Y. Hori leg. (EUMJ); 1 male, same locality, 19–X–1987, M. Sakai leg. (EUMJ); 1 male & 1 ex., Inaba, Iriomote Island, 9–VIII–1962, M. Satô & Y. Arita leg. (EUMJ).

**Distribution.** JAPAN: Hokkaido, Honshu, Shikoku, Kyushu, Amami-Ôshima, Okinawa, and Iriomote Islands. (Madagascar recorded by Karner (2012); Nepal, India and Bhutan recorded by Pal (1980).)

**Remarks.** This species was redescribed by Pal (1980) with a description of the larva. It is distributed worldwide except for Europe and North America and common at least in Japan and India (Hirano 2009; Karner 2012; Pal 1980).

Hirano (2009) and Hirano (2010) illustrated this species as *P. triguttatus* and suggested that the distribution of *P. trimaculatus* in Japan is doubtful. In this paper, it is regarded as *P. trimaculatus* on the basis of comparison of the male genital structure of the species illustrated by Pal (1985).

Pal (1985) gave as the distribution of this species Madagascar, Sri Lanka, Nepal, India, Malaysia, Burma, New Guinea, Australia and Japan, synonymizing the following species with *P. trimaculatus*: *Telephanus cruciger* Waterhouse, 1876 and *Psammoecus cephalotes* Grouvelle, 1919 from New Guinea, *Cucujus incommodus* Walker, 1859 from Sri Lanka and *Psammoecus ypsilon* Blackburn, 1903 from Australia (Walker 1859; Waterhouse 1876; Blackburn 1903; Grouvelle 1919). In addition, Thomas and Yamamoto (2007) recorded this species from Brazil. However, in view of the evidence that at least two other closely similar species have been confused with this species, past records of this species should be reexamined. The specimen figured by Thomas and Yamamoto (2007) seems to be another species. In this paper, records of this species from outside Japan are recognised from label data described by Pal (1980) and Karner (2012), on the basis that they examined the male genital structure.

### *Psammoecus triguttatus* Reitter, 1874

[http://species-id.net/wiki/Psammoecus\\_triguttatus](http://species-id.net/wiki/Psammoecus_triguttatus)

Japanese name: Nise-mitsumon-semaru-hiratomushi

Figs 1D, 6 and 13J–L

*Psammoecus triguttatus* [sic.] Reitter, 1874: 524. Type locality: Japan; Type deposition: the Natural History Museum, London; Type examined. (misspelling)

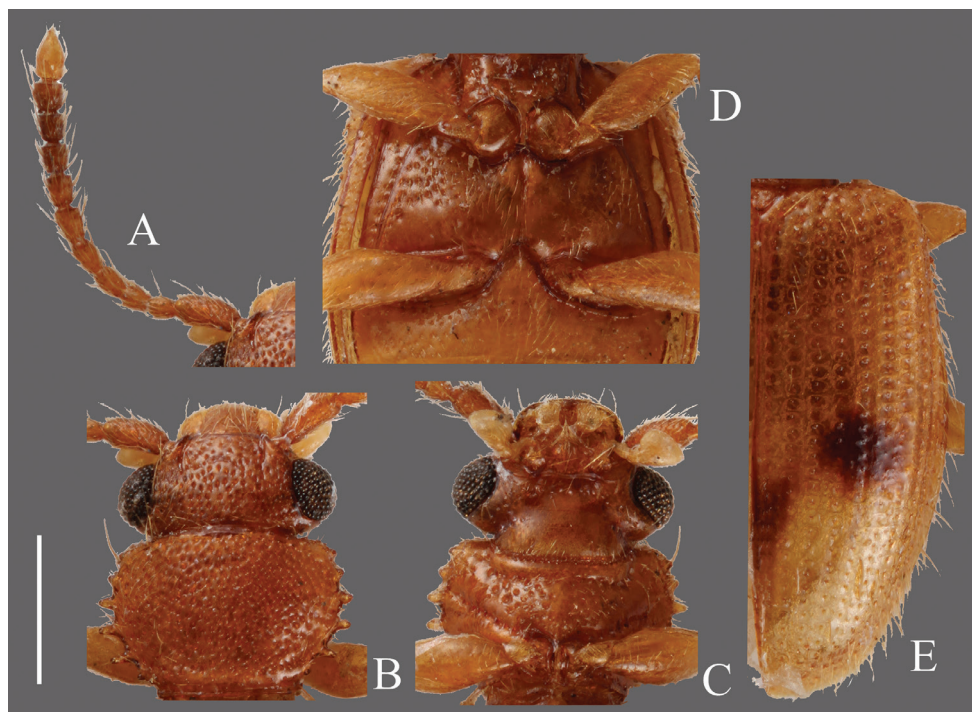
*Psammoecus triguttata* [sic.]: Hisamatsu 1982: 16.

*Psammoecus triguttatus*: Hetschko 1930: 82. (catalogue) – Kamiya 1961: 18, pl. 5. – Sasaji 1985: 204, fig. 33 in pl. 32. – Halstead et al. 2007

**Diagnosis.** This species is closely similar to *P. trimaculatus* and *P. labyrinthicus* sp. n. Morphological differences among these species were stated in diagnosis of *P. trimaculatus*.

**Description. Body length.** 2.32–2.93 mm (n=23).

**Coloration** (Fig. 1D). Head and pronotum yellowish-brown to reddish-brown. Elytra yellowish-brown with variable dark maculae: round ones at half, oval ones on the posterior half to posterior 1/4 of elytral suture, sometimes connected with maculae at



**Figures 6.** *Psammoecus triguttatus* Reitter, 1874, lectotype, male. **A** Left antenna **B** head and pronotum of dorsal view **C** head and pronotum of ventral view **D** metaventrite **E** right elytron with rows of punctures and pubescence. Scale: 0.5 mm.

half, darkened around end of elytra. Antennae reddish-brown basally, blackish-brown from 8th to 10th antennomeres, 11th (apex) comparatively bright.

**Head** (Fig. 6A, B, C). Triangular, HW/HL 1.46–1.90; IE/HL 0.92–1.20. Temples slightly expanded behind eyes, narrowed toward posterior. Eyes large, prominent. Dorsal surface with relatively dense punctuation. Antennae 1.06–1.38 mm, moderately long; covered with considerable medium length or long semi-erect setae and short pubescence on each antennomere; approximate ratio of lectotype as follows: 2.7 : 1.0 : 1.1 : 1.2 : 1.3 : 1.3 : 1.3 : 1.1 : 1.1 : 1.1 : 2.0 (Fig. 6A).

**Pronotum** (Fig. 6B, C). Broad, PW/PL 1.31–1.50. Dorsal surface with relatively dense punctuation. Pubescence composed of relatively fine short or medium length setae, a long seta on each tooth on lateral margins and anterior and posterior angles. Each anterior angle with four or five small teeth; each lateral margin with four teeth, tooth I small, tooth II longer than tooth I, teeth III and IV relatively narrow and of almost identical size, longer than tooth II, tooth V smallest or absent; each posterior angle with a few very small protuberances of variable shape.

**Elytra** (Fig. 6E). Elongate-oval, EW/BL 0.39–0.45. Rows of punctures narrower than interstices. Pubescence composed of many semi-erect setae of medium length; several long setae in a row around anterolateral margins.

**9th abdominal sternite** (Fig. 13J). Strut Y-shaped, cut at anterior 2/5. Lateral sclerites curved inward, relatively elongate.

**Aedeagus** (Fig. 13K, L). Parameres club-shaped, wide around bases, posterior inner margins of wide portions a little prominent, punctuation on narrow portions relatively sparse, a little denser on wide portions, posterior half of inner margins of wide portions with many setae, narrow portions with several sparse setae, apex with a long seta. Posterior half of phallobase wider towards posterior margin, distance between posterior margin and deepest point of incision of margin of upper layer narrow, protuberances around anterior 1/4 pointed inwards, posterior margin of lower layer widely deeply incised. Penis relatively flat and thin, narrowed toward apex, punctuation around apex denser toward apex.

**Type series.** Lectotype: male, Nagasaki, Nagasaki Prefecture, Japan, 1869, G. Lewis leg. (BMNH). Paralectotype: 1 female, same locality, 1869, G. Lewis leg. (BMNH). (here designated)

**Specimens examined.** JAPAM: [Tokyo Pref.] 1 male, Hatagaya, Shibuya-ku, 30–VII–1956, K. Tanaka leg. (EUMJ). [Gifu Pref.] 1 male, Tentoku, Toki-chô, Mizunami City, 6–VIII–2010, K. Itô leg. (ELKU); 1 male, Konokure, Toki-chô, Mizunami City, 16–VII–2011, K. Itô leg. (ELKU). [Kagoshima Pref.] 1 male, 4 females and 3 exs., Sata Cape, Minamiôsumi Town, 6–VII–1968, K. Suga leg. (HUSE); 1 male, Nakanoshima Island, Toshima Village, 9–VII–1969, M. Satô leg. (EUMJ); 1 male, same locality, 26–VI–1965, S. Fukuda leg. (HUSE). [Okinawa Pref.] 1 male, Aha beach, Kunigami Village, Okinawa Island, 23–I–2008, Y. Hirano leg. (YHC); 2 males and 2 exs., Motobu Town, Okinawa Island, 19–VIII–2008, T. Yoshida leg. (ELKU); 1 male, Fusato, Nanjô City, Okinawa Island, 5–VI–1970, M. Takagi leg. (EUMJ); 1 male, Mt. Omoto-san, Ishigaki Island, 1–VII–1965, Y. Hori leg. (EUMJ); 1 male, Ushuku-no-mori, Iriomote Island, 26–VI–1965, Y. Hori leg. (EUMJ).

**Distribution.** JAPAN: Honshu, Kyushu, Nakanoshima (Tokara Islands), Okinawa, Ishigaki and Iriomote Islands.

**Remarks.** *Psammoecus* sp. 4 illustrated by Hirano (2009) and Hirano (2010) seems to be this species or *P. labyrinthicus* sp. n. However, identification is difficult, because the specimen is a female. The Japanese name of *Psammoecus* sp. 4 given by Hirano (2009) and Hirano (2010) “Nise-mitsumon-semaru-hiratomushi” is adopted as the Japanese name of this species in this paper.

Halstead et al. (2007) recorded distribution of this species from Russia (Far East), Korea, China and Japan. However, it is now clear that at least two closely similar species occur in Japan, so, past records of this species should be reconfirmed. In addition, two or more closely similar species were sometimes found in the same limited area such as Tentoku, Toki-cho, Mizunami City, Gifu Prefecture where *P. triguttatus* and *P. trimaculatus* were collected. Thus, these species should be identified carefully.

Syntypes of this species consist of two specimens, one male and one female. The male specimen is designated as a lectotype, and the female specimen is designated as a paralectotype.

***Psammoecus labyrinthicus* sp. n.**

<http://zoobank.org/D11F2212-7A76-46A8-951C-B3FCC1543BCC>

[http://species-id.net/wiki/Psammoecus\\_labyrinthicus](http://species-id.net/wiki/Psammoecus_labyrinthicus)

[Japanese name: Hachijô-mitsumon-semaru-hiratomushi]

Figs 1E, 7 and 14A–C

**Diagnosis.** This species is closely similar to *P. trimaculatus* and *P. triguttatus*. However, it can be distinguished by the male genital structure, especially the shape of the parameres, and the comparatively dense punctuation of the dorsal pronotum.

**Description.** **Body length:** 2.66–3.38 mm (n=25).

**Coloration** (Fig. 1E). Head and pronotum reddish-brown. Elytra yellowish-brown with dark maculae; round ones at half, oblong ones on the posterior half to posterior 1/4 along elytral suture, darkened around end of elytra: these maculae sometimes connected each other. Antennae reddish-brown basally, 7th antennomere darkened, from 8th to 10th blackish-brown, 11th (apex) comparatively bright.

**Head** (Fig. 7A, B, C). Rounded-triangular, HW/HL 1.25–2.00; IE/HL 0.75–1.27. Temples slightly expanded behind eyes, gradually narrowed. Eyes large, prominent. Dorsal surface with dense and strong punctuation. Antennae 1.35–1.56 mm, moderately long; covered with medium length semi-erect pubescence and some long erect setae on each antennomere; approximate ratio of holotype as follows: 2.4 : 1.0 : 1.0 : 1.2 : 1.3 : 1.1 : 1.1 : 1.1 : 1.1 : 1.1 : 1.9 (Fig. 7A).

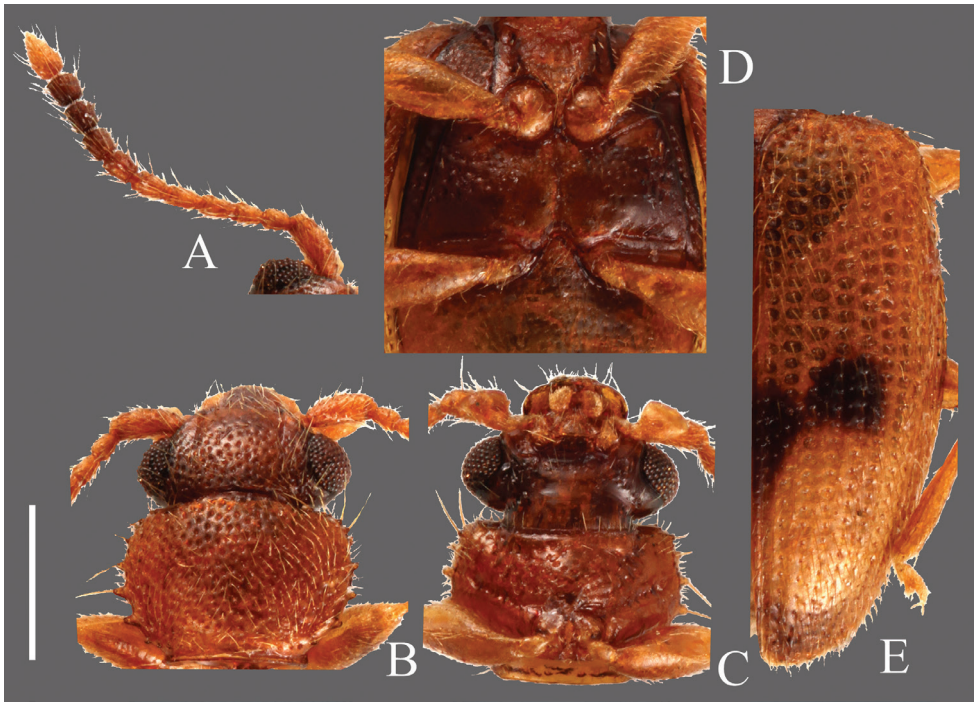
**Pronotum** (Fig. 7B, C). Roundly subquadrate, PW/PL 1.25–1.53. Relatively strong and dense punctuation on dorsal surface. Pubescence composed of short setae, a long seta on each tooth on lateral margins and anterior and posterior angles. Each anterior angle with several small teeth, each lateral margin with four short teeth; tooth I small, tooth II longer than tooth I, teeth III and IV almost the same size, longer than tooth II, teeth II, III and IV broadened at base, each posterior angle with a very small tooth, the shape of these teeth variable.

**Elytra** (Fig. 7E). Elongate-oval, EW/BL 0.41–0.47. Rows of punctures narrower than interstices. Pubescence composed of numerous medium length semi-erect setae and some long setae in a row around lateral margins.

**9th abdominal sternite** (Fig. 14A). Strut relatively short, cut at anterior 1/3. Lateral sclerites fused with strut, curved inwards.

**Aedeagus** (Fig. 14B, C). Parameres stout, club-shaped, punctuated on anterior half of inner margins, anterolateral portions well punctuated, anterior half of inner margins with many setae of variable size, apex with a long seta. Phallobase broadened toward posterior margin, posterior margin widely incised, protuberances around 1/3 of inner margins of branches, especially right protuberance thin. Penis flat, narrowed toward apex, apex pointed, punctuated around anterior 1/8, apex densely punctuated.

**Type series.** Holotype: male, Hachijô Island, Hachijô Town, Tokyo Prefecture, Japan, 21–VII–1957, S. Hisamatsu leg. (EUMJ). Paratypes: [Tokyo Pref.] 3 females, same data as holotype. (EUMJ). [Mie Pref.] 4 males, Ujitachi-chô, Ise City, 29–VIII–



**Figures 7.** *Psammoecus labyrinthicus* sp. n., holotype, male. **A** Left antenna **B** head and pronotum of dorsal view **C** head and pronotum of ventral view **D** metaventricle **E** right elytron with rows of punctures and pubescence. Scale: 0.5 mm.

2009, N. Narukawa leg. (ELKU). [Nagasaki Pref.] 1 male and 11 exs., Ta, Toyota-ma-chô, Tsushima Island, 7–VII–2013, T. Yoshida leg. (ELKU). [Kagoshima Pref.] 2 males and 3 exs., Takarajima Island, Toshima Village, 2–VII–1960, M. Satô leg. (EUMJ); 1 ex., same locality, 3–VII–1960, M. Satô leg. (EUMJ); 1 ex., same locality, 1–VI–1962, M. Satô leg. (EUMJ).

**Distribution.** JAPAN: Honshu, Hachijô (Izu Islands), Tsushima, Takarajima Islands (Tokara Islands).

**Biological notes.** The first author (Yoshida) collected many individuals of this new species from dead leaves of evergreen trees in Tsushima Island, Nagasaki Prefecture (Fig. 15A).

**Etymology.** The specific name means ‘labyrinthine’. Identification of *P. trimaculatus* and closely similar species is very difficult. The addition of this new species to this group of closely similar species made their identification more difficult like the labyrinth.

**Remarks.** *Psammoecus trimaculatus* is closely related to this species, however the former has been often collected from dead leaves of monocotyledon plant. These two species may have each distinct ecological trait.



***Psammoecus boreas* sp. n.**

<http://zoobank.org/1E58DE65-FC6D-4E40-B55E-A952B311A454>

[http://species-id.net/wiki/Psammoecus\\_boreas](http://species-id.net/wiki/Psammoecus_boreas)

Japanese name: Arame-semaru-hiratomushi

Figs 2A, 8 and 14D–F

*Psammoecus triguttatus*: Nakane 1963: 195, fig. 16 in pl. 98.

*Psammoecus* sp. 3, Hirano 2009: 63, 66, 67, fig. 8. – Hirano 2010: 12, 16.

**Diagnosis.** This species is similar to *P. trimaculatus* and other species closely similar to *P. trimaculatus*. Nakane (1963) provided a figure of this species as *P. triguttatus*. It differs from the aforementioned species by the shorter lateral teeth of the pronotum. It is also very similar to *P. harmandi* Grouvelle, 1912 both in external characters and male genital structure as illustrated by Pal (1980), but can be distinguished from it by the longer antennae and the comparatively oblong 10th antennomere.

**Description.** **Body length.** 2.74–3.27 mm (n=19).

**Coloration** (Fig. 2A). Head and pronotum yellowish-brown. Elytra yellowish-brown with dark brown maculae at half, oval ones at center of each elytron and dark oblique bands toward posterior portion, sometimes connected at elytral suture, forming a V-shaped band. Elytra of lighter color specimens with reduced maculae, oval ones and bands separated. Antennae yellowish-brown basally, posterior ends of 8th to 10th antennomeres darkened, or all antennomeres yellowish-brown in lighter colored specimens.

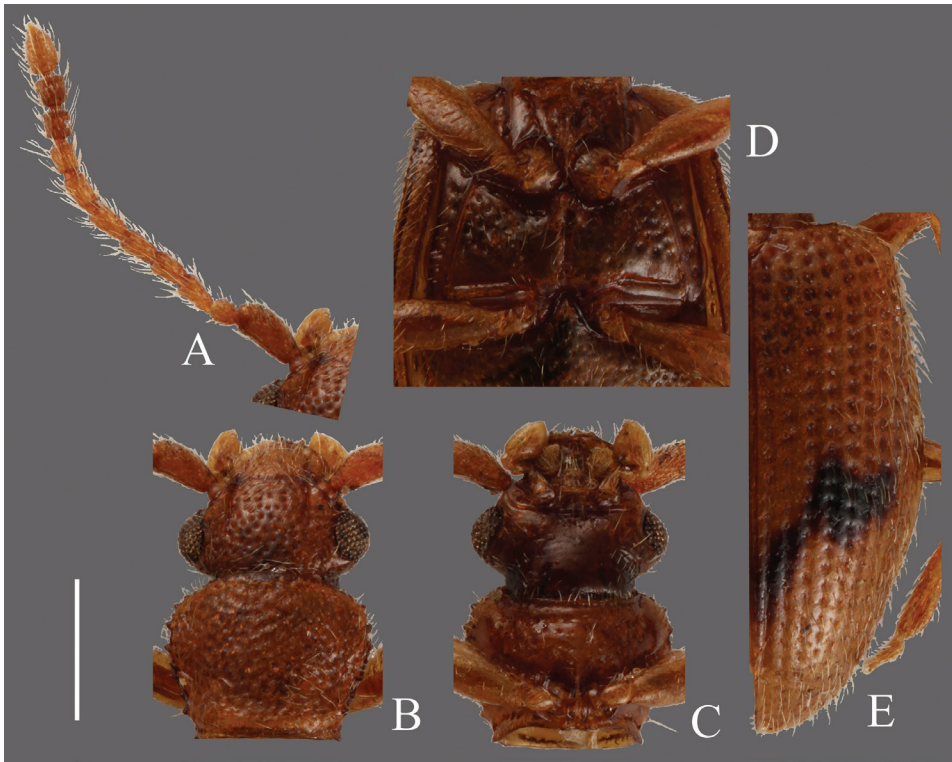
**Head** (Fig. 8A, B, C). Broad, HW/HL 1.35–1.65; IE/HL 0.96–1.13. Temples narrowed around each base. Eyes small, moderately rounded. Dorsal surface with moderately dense punctuation, ventral surface punctuated sparsely. Antennae 1.54–1.71 mm, thin, very long; covered with considerable long semi-erect pubescence on each antennomere; approximate ratio of holotype as follows: 2.6 : 1.0 : 1.1 : 1.2 : 1.2 : 1.3 : 1.2 : 1.0 : 1.0 : 1.1 : 1.7 (Fig. 8A).

**Pronotum** (Fig. 8B, C). Subquadrate, PW/PL 1.18–1.30. Dorsolateral portions lightly impressed. Dorsal surface with relatively dense punctuation, no punctures around posterior margin, comparatively sparse punctuation on ventral surface. Pubescence composed of many short setae and fine long setae on teeth on lateral margins and anterior and posterior angles. Each anterior angle with a distinct group of a few very small teeth, each lateral margin with four small teeth of almost the same size, each posterior angle with a small tooth, almost the same size as those on lateral margins.

**Elytra** (Fig. 8E). Oval, EW/BL 0.32–0.45. Rows of punctures wider than interstices. Pubescence composed of many short setae, no long setae.

**9th abdominal sternite** (Fig. 14D). Strut Y-shaped, cut deeply at anterior 1/5, diverging for posterior 1/4. Lateral sclerites elongate.

**Aedeagus** (Fig. 14E, F). Parameres cone-shaped with almost even sparse punctuation, sparser on bases, a few long setae around apical portions, a few short setae distributed sparsely. Phallobase tube-like, consisting of two layers, anterior margin rounded, dorsal surface around anterior margin thin, protuberances of upper layer directed towards



**Figures 8.** *Psammoecus boreas* sp. n., holotype, male. **A** Left antenna **B** head and pronotum of dorsal view **C** head and pronotum of ventral view **D** metaventricle **E** right elytron with rows of punctures and pubescence. Scale: 0.5 mm.

anterior portion, small protuberances at beginning of divergence of upper layer. Penis stout, punctuated on posterior 1/9, rather coarsely on ventral surface.

**Type series.** Holotype: male, Yoshin, Tanzawa, Kanagawa Prefecture, Japan, 26–V–1989, Y. Hirano leg. (EUMJ). Paratypes: [Hokkaido Pref.] 2 exs., Chûbisei, Memuro Town, 25–VIII–1995, S. Hisamatsu leg. (EUMJ); 1 ex., Mt. Sapporo-dake, Sapporo City, 5–VIII–1970, S. Kinoshita leg. (EUMJ). [Niigata Pref.] 1 ex., Mikuni Touge, 1–VII–1967, K. Baba leg. (HUSE). [Kanagawa Pref.] 1 ex., Yoshin, Tanzawa, 26–V–1989, Y. Hirano leg. (YHC). [Nagano Pref.] 1 ex., Tokugo Touge, 29–VII–1955, T. Nakane leg. (HUSE); 5 exs., Ôbora, Ueda City, 24–VII–2013, T. Yoshida leg. (ELKU). [Oita Pref.] 6 ex., Mt. Sobo-san, 7–VI–2009, S. Yamamoto leg. (ELKU).

**Distribution.** JAPAN: Hokkaido, Honshu, Kyushu.

**Etymology.** The specific name is from the god of the north wind of ancient Greek mythology. Most *Psammoecus* species are distributed in tropical or subtropical zones, however, this new species is exceptionally distributed in Hokkaido or on mountains of high altitude located in Honshu and Kyushu.

**Remarks.** *Psammoecus* sp. 3 illustrated by Hirano (2009) and Hirano (2010) was conspecific with this species and named same Japanese name proposed by him.



***Psammoecus omotoensis* sp. n.**

<http://zoobank.org/E64E6D2D-B71B-40FC-83FA-551947595432>

[http://species-id.net/wiki/Psammoecus\\_omotoensis](http://species-id.net/wiki/Psammoecus_omotoensis)

Japanese name: Higenaga-semaru-hiratomushi

Figs 2B, 9 and 14G–I

**Diagnosis.** This species is similar to *P. trimaculatus* and other species closely similar to *P. trimaculatus*. However, it can be distinguished from them by the male genital structure, especially the parameres which are fused to the phallobase. The distinguishing external characters of this species are tooth IV of the lateral margins of pronotum extended in a posterolateral direction and the long antennae, especially the 1st antennomere.

**Description. Body length.** 2.71–2.77 mm (n=2).

**Coloration** (Fig. 2B). Head and pronotum yellowish-brown to reddish-brown. Elytra yellowish-brown with dark maculae, round ones at half of each elytron, black ones on posterior half of elytral suture narrower toward posterior elytral suture, a thin short black band between these maculae. Antennae yellowish-brown, almost unicolorous, 11th (apical) antennomere comparatively bright.

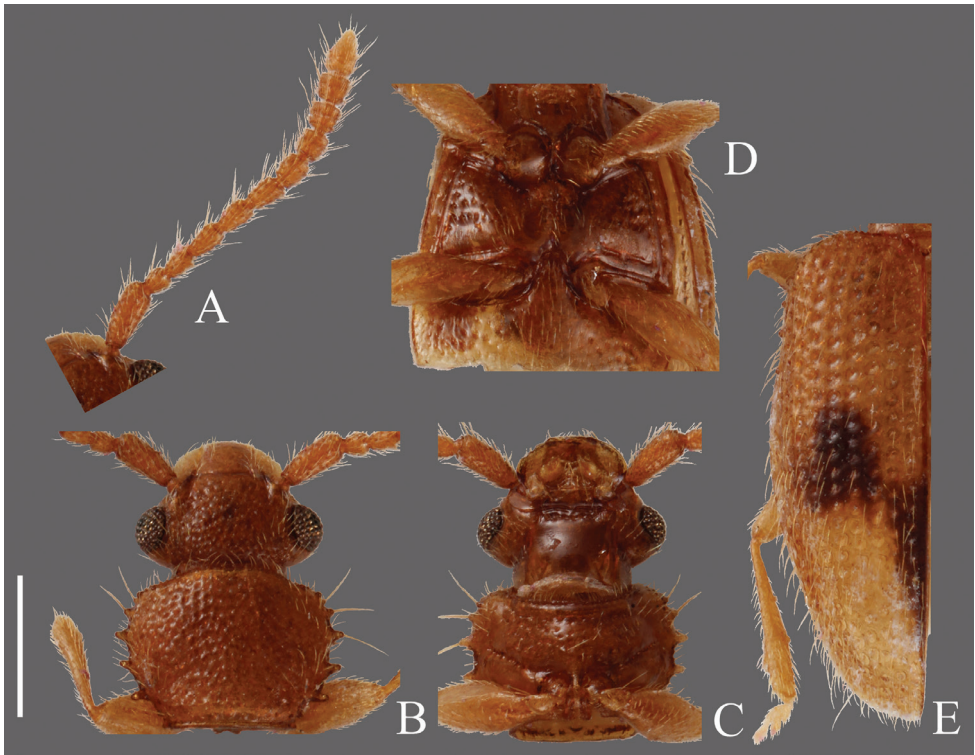
**Head** (Fig. 9A, B, C). Transverse, HW/HL 1.59–1.63; IE/HL 1.07. Temples well enlarged behind eyes, narrowed at bases. Eyes small, moderately rounded. Frequent pubescence and very sparse punctuation on ventral surface, moderately dense punctuation on dorsal surface. Antennae 1.44–1.49 mm long; covered with frequent medium length semi-erect fine setae and some long erect setae on each antennomere; approximate ratio of holotype as follows: 2.6 : 1.0 : 1.2 : 1.4 : 1.4 : 1.4 : 1.3 : 1.1 : 1.2 : 1.0 : 1.9 (Fig. 9A).

**Pronotum** (Fig. 9B, C). Transverse, PW/PL 1.30–1.35. Punctuation on dorsal surface coarse. Pubescence composed of short fine setae, a long seta on each tooth on lateral margins and anterior and posterior angles. Each anterior angle with several very small prominences and two small teeth, each lateral margin with four teeth; tooth I comparatively small, teeth II and III almost the same size, longer than tooth I, tooth IV extended in posterolateral direction, longer than tooth II and III, each posterior angle with a very small protuberance.

**Elytra** (Fig. 9E). Oval, EW/BL 0.37–0.44. Around half of lateral margins relatively expanded. Rows of punctures wider than interstices. Pubescence composed of medium length semi-erect setae and a few long setae around anterolateral margins.

**9th abdominal sternite** (Fig. 14G) Strut Y-shaped, anterior 2/7 slightly thickened, cut from anterior 2/7, diverging in posterior 1/3, branches long, ends of each branch curved inwards. Lateral sclerites elongate, membranous.

**Aedeagus** (Figs 14H and I) Parameres fused with phallobase, incised shallowly at inner and lateral margins of bases, relatively stout, gradually curved inwards, three long setae around posterior 1/3, some short setae on posterior half, well punctuated on anterior half of inner margins. Phallobase broad and somewhat flat, anterior margin widely but shallowly incised, lateral margins slightly depressed around anterior 1/4. Penis wide, thinner toward apex, narrowed around apex, punctuated around apex, densely punctuated at apex.



**Figures 9.** *Psammoecus omotoensis* sp. n., holotype, male. **A** Right antenna **B** head and pronotum of dorsal view **C** head and pronotum of ventral view **D** metaventricle **E** left elytron with rows of punctures and pubescence. Scale: 0.5 mm.

**Type series.** Holotype: male, Mt. Omoto-san, Ishigaki Island, Okinawa Prefecture, Japan, 23–III–2000, T. Kurihara leg. (EUMJ). Paratype: [Okinawa Pref.] 1 male, same data as holotype, T. Kurihara leg. (EUMJ).

**Distribution.** JAPAN: Ishigaki Island.

**Etymology.** The specific name is derived from the type locality of the new species, Mt. omoto-san, Ishigaki Island, Okinawa Prefecture.

***Psammoecus simoni* Grouvelle, 1892**

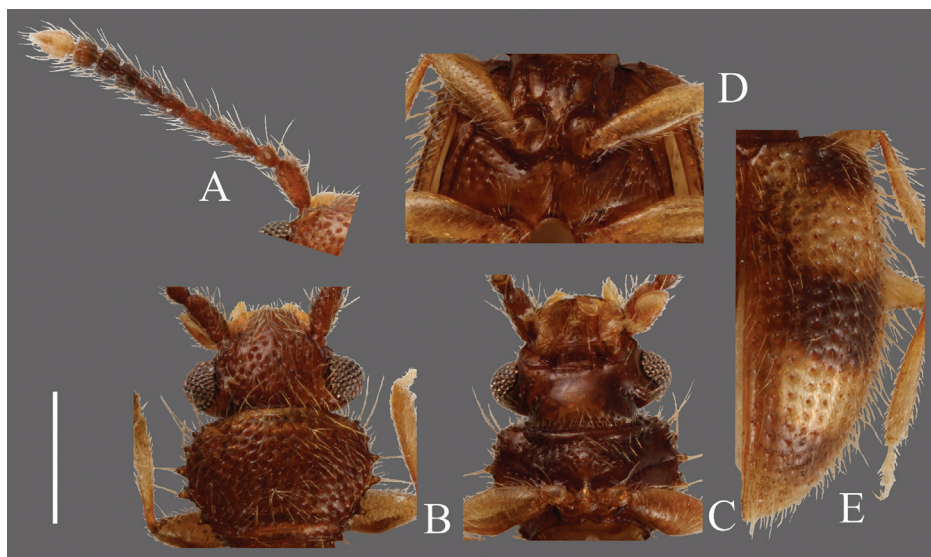
[http://species-id.net/wiki/Psammoecus\\_simoni](http://species-id.net/wiki/Psammoecus_simoni)

Japanese name: Hababiro-semaru-hiratomushi

Figs 2C, 10 and 14J–L

*Psammoecus simonis* [sic.] Grouvelle, 1892: 287. Type locality: Philippine; Type deposition: Museum National d'Histoire Naturelle, Paris. (misspelling)

*Psammoecus simoni*: Grouvelle 1908: 476, 488. – Hetschko 1930: 81. (catalogue) – Pal 1985: 31, fig. 11. – Hirano 2009: 63, 65, 82, fig. 5. – Hirano 2010: 11, 14. – Karner 2012: 25, fig. 11.



**Figures 10.** *Psammoecus simoni* Grouvelle, 1892, male specimen which genital structures were illustrated in this paper (**B–E**) and another male specimen (**A**). **A** Left antenna **B** head and pronotum of dorsal view **C** head and pronotum of ventral view **D** metaventricle **E** right elytron with rows of punctures and pubescence. Scale: 0.5 mm.

**Diagnosis.** This species is distinguished from other Japanese *Psammoecus* species by the black elytra with yellow maculae and the posterior teeth on lateral margins of pronotum longer than those of anterior margins.

**Description.** **Body length.** 2.24–2.56 mm (n=8).

**9th abdominal sternite** (Fig. 14J). Strut comparatively short, cut at anterior 2/5, diverging gradually, branches comparatively long and wide. Lateral sclerites elongate, slightly curved inwards, apical sclerites pointed.

**Aedeagus** (Fig. 14K, L). Parameres fused with phallobase, wide, short, posterior and lateral portions punctuated sparsely, densely punctuated triangular areas in anterior portions, a few long setae and short setae on posterior half, several short folds around beginning of divergence of parameres, a few lines on upper densely punctuated areas. Phallobase stout, broad in lateral aspect, anterior margin straight, a few subparallel lines on posterior dorsal portion. Penis comparatively broad, flattened around apex, apical margin rounded, punctuated sparsely on apex.

**Specimens examined.** JAPAN: [Okinawa Pref.] 1 male, 4 females & 2 exs., Inamine, Nago City, Okinawa Island, 26–IX–2012, T. Yoshida leg. (ELKU); 1 ex., Mt. Yarabu-dake, Ishigaki Island, 16–VI–2002, T. Watanabe leg. (ELKU).

**Distribution.** JAPAN: Okinawa, Hateruma and Ishigaki Islands; Madagascar; India; Sri Lanka; Malaysia; Indonesia; Philippines.

**Biological notes.** This species is found in dead leaves to which fungi are attached and occurs sympatrically with other Silvanid species such as *P. trimaculatus*, *P. scitus* sp. n., *Cryptamorphus desjardinsi* (Guérin-Ménéville, 1844) and *Monanus concinnulus* (Walker, 1858) (Fig. 15B).

**Remarks.** Pal (1980) and Karner (2012) redescribed this species. Grouvelle (1892) described it as ‘simonis’. However, Grouvelle (1908) referred to it with the specific name ‘simoni’. Pal (1980), Hirano (2010) and Karner (2012) used the latter spelling, which we adopt in the present study.

***Psammoecus fasciatus* Reitter, 1874**

[http://species-id.net/wiki/Psammoecus\\_fasciatus](http://species-id.net/wiki/Psammoecus_fasciatus)

Japanese name: Kuroobi-semaru-hiratomushi

Figs 2D, 11 and 14M–O

*Psammoecus* [sic.] *fasciatus* Reitter, 1874: 525. Type locality: Japan; Type deposition: the Natural History Museum, London; Type examined. (misspelling)

*Psammoecus fasciatus*: Hetschko 1930: 82. (catalogue) – Nakane 1963: 196, fig. 16 in pl. 98. – Hisamatsu 1977: 21. – Sasaji 1985: 204, fig. 34 in pl. 32. – Sato 1989: 377. – Halstead et al. 2007 – Hirano 2009: 64. – Hirano 2010: 12, 13. – Yoshida and Hirowatari 2013: 5, 11, 16, 17.

**Diagnosis.** This species is closely similar to *P. hiranoi*. It can be distinguished by the longer parameres, the shallower incision of the phallobase on the anterior 1/4 and the shorter teeth on the lateral margins of the pronotum.

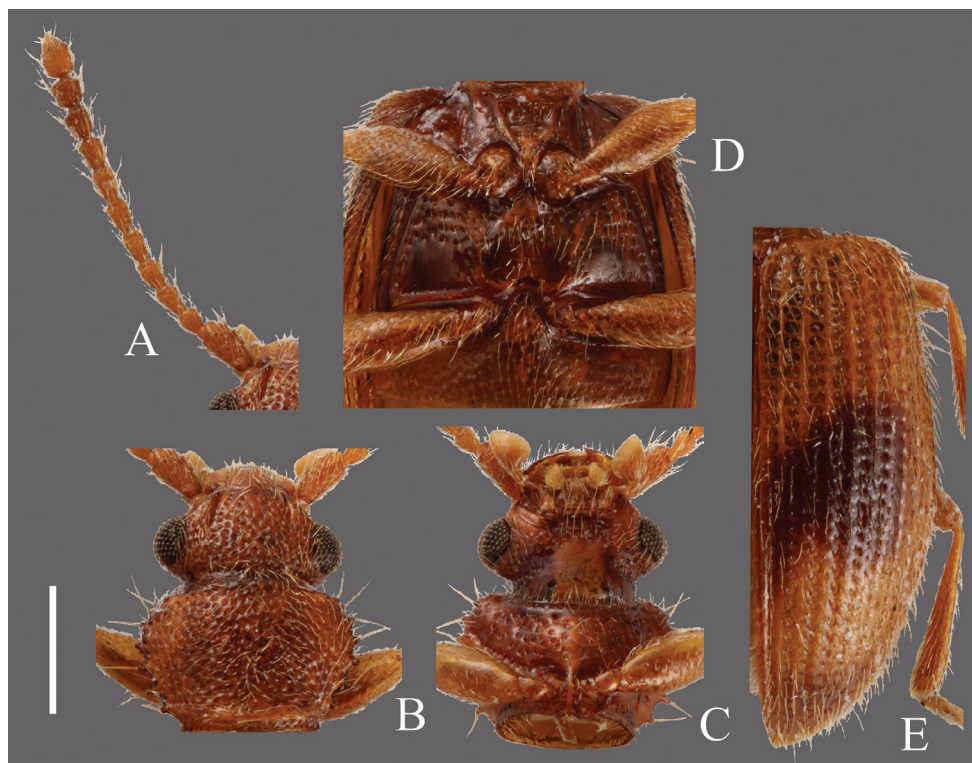
**Description. Body length.** 2.75–3.50 mm (n=49).

**Coloration** (Fig. 2D). Head and pronotum yellowish-brown to reddish-brown. Elytra with a variable horizontal dark band at middle, this band in lighter color specimens thinner towards elytral suture, lateral margins, apical portion and posterior elytral suture dark. Antennae brown or reddish-brown basally, 7th and 8th antennomeres darker, 9th and 10th almost black, 11th (apex) lighter than basal ones. Antennae of some specimens almost unicolorous.

**Head** (Fig. 11A, B, C). Broad, HW/HL 1.40–2.08; IE/HL 0.94–1.38. Temples enlarged behind eyes, narrowed gradually toward posterior margin. Eyes large, slightly prominent. Ventral surface with rough irregular punctuation, sparser punctuation on dorsal surface. Antennae 1.38–1.57 mm, 2nd antennomere short; covered with thick medium length pubescence and some long erect pubescence on each antennomere; approximate ratio of lectotype as follows: 2.5 : 1.0 : 1.3 : 1.3 : 1.3 : 1.3 : 1.3 : 1.3 : 1.3 : 1.2 : 1.8 (Fig. 11A).

**Pronotum** (Fig. 11B, C). Broad, PW/PL 0.69–1.52. Punctuation on dorsal surface very dense, but no punctures around posterior margin, punctuation on ventral surface sparser than dorsal surface, some of them in rows especially on posterior half. Pubescence composed of frequent short setae on dorsal surface and a long seta on each tooth on lateral margins and at anterior and posterior angles. Each anterior angle with a distinct group of a few very small teeth, each lateral margin with four teeth; tooth I comparatively small, teeth II, III and IV almost the same moderate size, each posterior angle with a comparatively small tooth.





**Figures 11.** *Psammoecus fasciatus* Reitter, 1874, lectotype, male. **A** Left antenna **B** head and pronotum of dorsal view **C** head and pronotum of ventral view **D** metaventricle **E** right elytron with rows of punctures and pubescence. Scale: 0.5 mm.

**Elytra** (Fig. 11E). Elongate-oval, EW/BL 0.41–0.47. Punctures wider than interstices. Pubescence composed of semi-erect medium length setae and some long erect setae in a row around lateral margins, longer toward anterior portion.

**9th abdominal sternite** (Fig. 14M). Strut cut at around half, diverging widely around the posterior base, ends of each branch curved inwards. Lateral sclerites triangular, flat.

**Aedeagus** (Figs 14N and O). Parameres simple stick-shaped, elongate, slightly curved inwards, punctuated sparsely except base, a few semi-long setae around apical portion. Phallobase diverging gradually around anterior 1/4, a little bulging along inner margins of each branch, lateral margins broadening. Penis also elongate, punctuated on posterior 1/6, more densely on ventral portion, especially densely on apical portion.

**Type series.** Lectotype: male, Mt. Maya-san, Kobe City, Hyogo Prefecture, Japan, 1871, G. Lewis leg. (BMNH). Paralectotype: 1 female, same locality, 1871, G. Lewis leg. (BMNH). (here designated)

**Specimens examined.** Russia: [Primorsky Krai] 1 ex., Chuguevka Village, 27–VI–1999, Y. Notsu leg. (EUMJ). JAPAN: [Niigata Pref.] 1 male & 1 ex., Renge-Onsen, Itoigawa City, 14–VIII–2003, I. Tanaka leg. (ITC). [Tokyo Pref.] 7 exs.,

Mikura Island, Mikurajima Village, 11–VI–1977, T. Nakane leg. (HUSE). [Nagano Pref.] 1 ex., Togakushi-Kôgen, Nagano City, 5–6–VII–2008, K. Mizuno leg. (KMC); 2 ex., Ôbora, Ueda City, 24–VII–2013, T. Yoshida leg. (ELKU). [Kyoto Pref.] 1 ex., Kifune, Kyoto City, 6–IV–1988, I. Tanaka leg. (ITC). [Hyogo Pref.] 1 ex., Itoi, Asago City, 26–IX–2004, I. Tanaka leg. (ITC); 5 exs., Sakanotani, Shisô City, 19–VII–2009, K. Itô leg. (KMC); 1 ex., Onzui, Shisô City, 19–VII–2009, K. Utô leg. (KMC); 1 ex., Mt. Yuzuruha-san, Nantan Town, Awaji Island, 18–X–2003, I. Tanaka leg. (ITC). [Nara Pref.] 1 ex., Mt. Kasuga-yama, Nara City, 5–V–1985, I. Tanaka leg. (ITC); 2 exs., same locality, 5–V–2012, K. Ikeuchi leg. (ELKU); 1 ex., same locality, 31–VII–2012, K. Matsuda leg. (ELKU). [Tokushima Pref.] 1 ex., Mt. Shibakoya-yama, Kamiyama Town, 31–VII–1975, M. Yoshida leg. (EUMJ). [Ehime Pref.] 1 ex., Nishidani, Yanadani Village, 15–16–VII–1994, K. Aita leg. (EUMJ). [Kochi Pref.] 1 ex., Muroto Cape, Muroto City, 7–VI–1959, S. Hisamatsu leg. (EUMJ). [Nagasaki Pref.] 1 ex., Mt. Tatera-san, Tsushima Island 16–IX–1995, N. Narukawa leg. (ELKU); 3 exs., Midake, 12–X–1977, Y. Notsu leg. (EUMJ). [Kagoshima Pref.] 1 male & 4 exs., Kirishima, 29–VII–1971, T. Nakane leg. (HUSE); 2 exs., Shiratani-unsuikyô, Yakushima Island, 15–VIII–2005, J. Ogawa leg. (EUMJ); 1 male & 1 ex., Onoaida Hodô, Yakushima Island, 14–15–IX–2002, N. Ohbayashi leg. (EUMJ); 2 exs., Kosugidani, Yakushima Island, 2–V–1984, K. Mizuno leg. (OMNH); 4 exs., Anbô, Yakushima Island, 16–VII–1989, N. Narukawa leg. (ELKU); 5 exs., Nogi, Nishino-omote, Tanegashima Island, 10–VII–1974, S. Hisamatsu leg. (EUMJ).

**Distribution.** JAPAN: Hokkaido, Honshu, Shikoku, Kyushu, Mikura (Izu Islands), Awaji, Yakushima and Tanegashima Islands; Burma; Korea; Russia.

**Biological notes.** The first author (Yoshida) collected this species from various kinds of dead leaves from evergreen trees, deciduous trees and bamboo.

**Remarks.** The syntypes of this species consist of three specimens: two of them belong to this species, but the remaining one represents *P. trimaculatus* or *P. triguttatus*. We designate a male specimen as lectotype, and a female specimen as paralectotype. The type specimens were collected from Mt. Maya-san, Kobe City, Hyogo.

### *Psammoecus hiranoi* Yoshida & Hirowatari, 2013

[http://species-id.net/wiki/Psammoecus\\_hiranoi](http://species-id.net/wiki/Psammoecus_hiranoi)

Japanese name: Herimon-semaru-hiratomushi

Fig. 2E

*Psammoecus* sp. 1: Hirano 2009: 63, 66, 82, fig. 6. – Hirano 2010: 12, 15.

*Psammoecus* sp. 2: Hirano 2009: 63, 66, 82, fig. 7. – Hirano 2010: 12, 15.

*Psammoecus hiranoi* Yoshida and Hirowatari 2013: 86–90.

**Diagnosis.** This species is closely similar to *P. fasciatus* and morphological differences between these two species were stated in diagnosis of *P. fasciatus*.

**Remarks.** Yoshida and Hirowatari (2013) described this species from the Nansei Islands, Japan including Nakanoshima (Tokara Islands), Amami-Ōshima, Tokunoshima, Okinawa, Ishigaki and the Iriomote Islands. It is closely similar to *P. fasciatus*, and these two species occur allopatrically across the Watase Line, which is one of the biogeographic borders proposed between the Palaearctic and Oriental regions passing through the Tokara Straits (Yoshida and Hirowatari 2013).

Yoshida and Hirowatari (2013) described this species and regarded the undetermined species, *Psammoecus* sp. 2 of Hirano (2009) and Hirano (2010), as conspecific. In addition, in the present study, *Psammoecus* sp. 1 illustrated by Hirano (2009) and Hirano (2010), which was represented by only one female, is also found to be conspecific with this species. We had the opportunity to examine some specimens possessing features of *Psammoecus* sp. 1 (Fig. 2E) and were able to conclude that morphological characters including the male genital structure of these specimens belonged to the range of morphological variation of *P. hiranoi*.

The following specimens were found after description of this species:

**Specimens examined.** JAPAN: [Okinawa Pref.] 1 male & 4 exs., Mt. Yonaha-dake, Kunigami Village, Okinawa Island, 3–IV–1974, T. Kinoshita leg. (EUMJ); 10 exs., Ōkuni-rindō, Kuigami Village, Okinawa Island, 4–XI–2013, T. Yoshida leg. (ELKU).

#### *Psammoecus quadrimaculatus* Reitter, 1874

[http://species-id.net/wiki/Psammoecus\\_quadrimaculatus](http://species-id.net/wiki/Psammoecus_quadrimaculatus)

Japanese name: Ruisu-yotsumon-semaru-hiratomushi

Figs 2F, 12 and 14P–R

*Psammoecus* [sic.] *quadrimaculatus* Reitter, 1874: 525. Type locality: Japan; Type deposition: the Natural History Museum, London; Type examined. (misspelling)

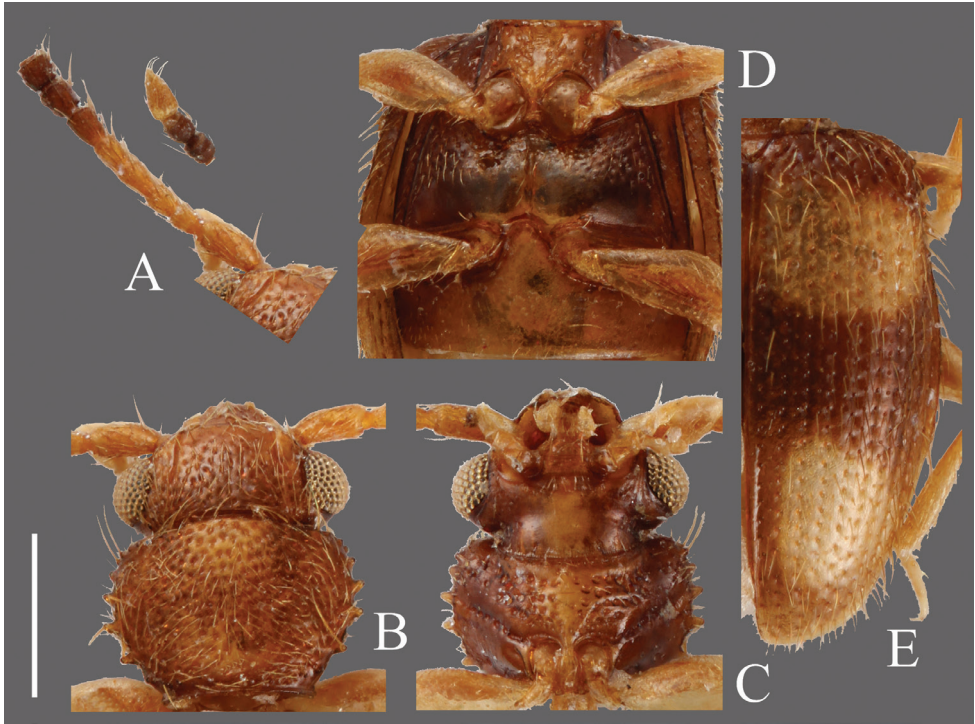
**Diagnosis.** This species is similar to *P. trimaculatus*, *P. triguttatus* and *P. labyrinthicus* sp. n., but can be distinguished from *P. trimaculatus* and *P. triguttatus* by the wide triangular basal portion of the parameres and the apically narrow portion of the penis, and from *P. labyrinthicus* sp. n. by the longer parameres, the apically narrow portion of the penis and the shape of the phallobase.

**Description. Body length.** 2.50 mm (n=1).

**Coloration** (Fig. 2F). Head reddish-brown, pronotum somewhat light reddish-brown. Elytra blackish-brown with four large yellowish-brown maculae; macula around anterior 1/4 of each elytron almost quadrate, macula on posterior half longer than wide. Antennae yellowish-brown basally, 6th to 10th antennomeres black, 6th slightly brighter, 11th (apex) bright.

**Head** (Figs 12A, B and C). Rounded-triangular, HW/HL 1.68; IE/HL 1.09. Temples slightly expanded behind eyes, narrowed at base. Eyes large, prominent, diameter about half of length of head. Punctuation of dorsal surface moderately dense, on ventral surface sparse, and absent on center portion of ventral surface. Antennae





**Figures 12.** *Psammoecus quadrimaculatus* Reitter, 1874, lectotype, male. **A** Left antenna **B** head and pronotum of dorsal view **C** head and pronotum of ventral view **D** metaventricle **E** right elytron with rows of punctures and pubescence. Scale: 0.5 mm.

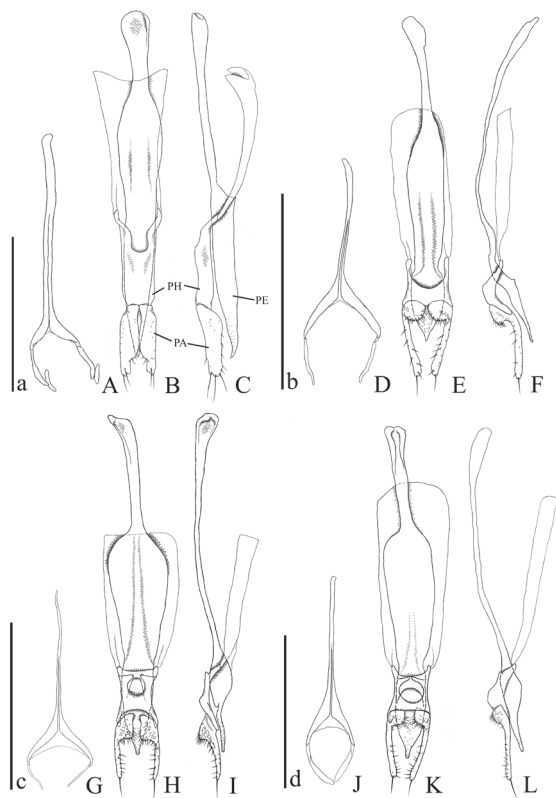
1.44 mm; covered with medium length pubescence and some relatively long erect setae on each antennomere; approximate ratio of holotype as follows: 2.4 : 1.0 : 1.0 : 1.1 : 1.1 : 1.3 : 1.0 : 1.1 : 1.2 : 1.1 : 2.2 (Fig. 12A).

**Pronotum** (Fig. 12B, C). Roundly subquadrate, PW/PL 1.34. Punctuation on dorsal surface relatively strong and moderately sparse. Pubescence composed of medium length setae, a long seta on each tooth on lateral margins and anterior angles, a relatively long seta on each posterior angle. Each anterior angle with several small teeth, each lateral margin with four short teeth; tooth I small, tooth II longer than tooth I, teeth III and IV almost same size, longer than tooth II, teeth II, III and IV relatively widened around base, each posterior angle with a few very small teeth.

**Elytra** (Fig. 12E). Elongate-oval, EW/BL 0.46. Rows of punctures wider than interstices. Pubescence composed of many medium length semi-erect setae, long erect setae in a row on lateral margins.

**9th abdominal sternite** (Fig. 14P). Strut cut at anterior 1/3, diverging deeply around posterior 1/3. Lateral sclerites rhomboid, comparatively large, curved inwardly.

**Aedeagus** (Fig. 14Q, R). Parameres club-shaped; narrow portions relatively broad, punctuated sparsely, with several sparse setae, apex with a long seta; wide portions



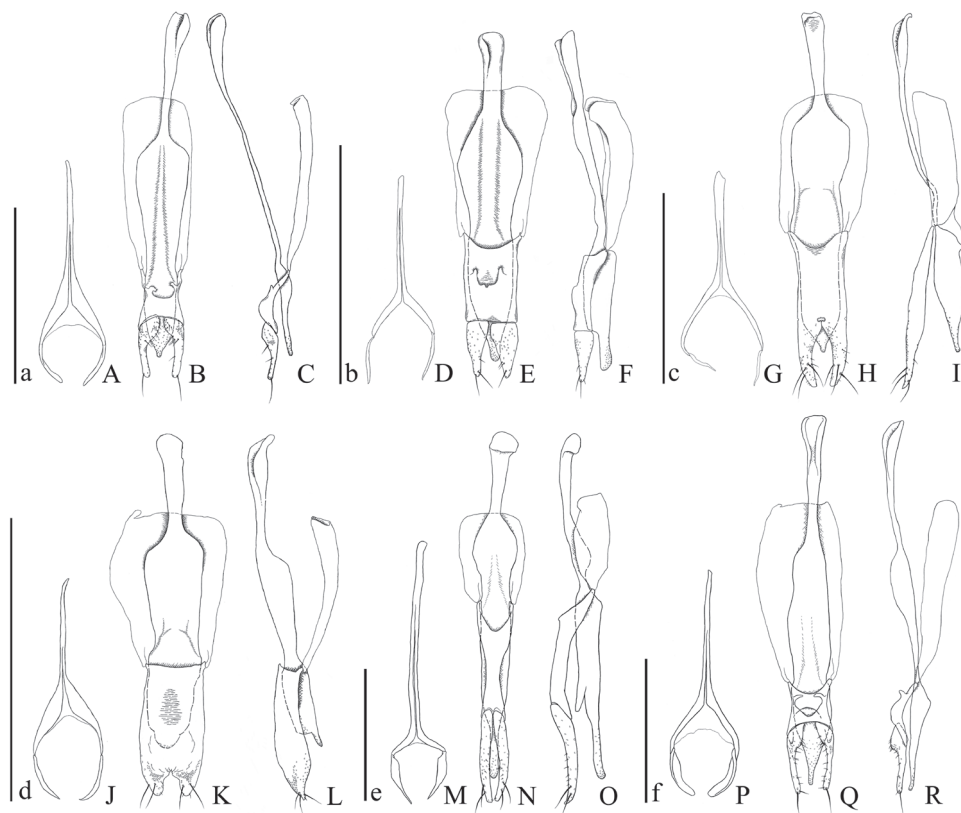
**Figures 13.** Male genital organs of *Psammoecus* spp. **A–C** *Psammoecus scitus* sp. n., holotype **D–F** *Psammoecus bipunctatus* (Fabricius, 1792) **G–I** *Psammoecus trimaculatus* Motschulsky, 1858 **J–L** *Psammoecus triguttatus* Reitter, 1874, lectotype. **A, D, G** and **J** 9th abdominal sternite **B, C, E, F, H, I, K** and **L** aedeagus in dorsal (**B, E, H** and **K**) and lateral (**C, F, I** and **L**). Abbreviations: PH—phallobase; PA—parameres; PE—penis. Scale: 0.5 mm; a for **A–C**; b for **D–F**; c for **G–I**; d for **J–L**.

punctuated densely on posterior half of inner margins and anterolateral portions of outer margins, posterior half of inner margins with many setae. Phallobase consisting of two layers, posterior margin incised roundly, distance between posterior margin and deepest point of incision of margin of upper layer narrow, anterior margin of lower layer relatively narrowly incised, protuberances around anterior 1/4 narrow, projecting inwards, posterior margin of lower layer broadly incised. Penis relatively elongate and flat, with relatively dense punctuation on posterior 1/8.

**Type series.** Holotype: male, Nagasaki, Nagasaki Prefecture, Japan, 1869, G. Lewis leg. (BMNH).

**Distribution.** JAPAN: Nagasaki?.

**Remarks.** Type specimen was mounted with a label reading ‘Nagasaki | 1869 | ? imported in Rice –’. We have not been able to find any specimen of this species from Japan other than holotype. Hence, occurrence of this species in Japan seems to be questionable.



**Figures 14.** Male genital organs of *Psammoecus* spp. **A–C** *Psammoecus labyrinthicus* sp. n., holotype **D–F** *Psammoecus boreas* sp. n., holotype **G–I** *Psammoecus omotoensis* sp. n., holotype **J–L** *Psammoecus simoni* Grouvelle, 1892 **M–O** *Psammoecus fasciatus* Reitter, 1874, lectotype **P–R** *Psammoecus quadrimaculatus* Reitter, 1874, holotype. **A, D, G, J, M** and **P** 9th abdominal sternite; **B, C, E, F, H, I, K, L, N, O, Q** and **R** aedeagus in dorsal (**B, E, H, K, N** and **Q**) and lateral (**C, F, I, L, O** and **R**). Scale: 0.5 mm; a for **A–C**; b for **D–F**; c for **G–I**; d for **J–L**; e for **M–O**; f for **P–R**.



**Figures 15.** The habitat of *Psammoecus labyrinthicus* sp. n. **(A)** and *Psammoecus simoni* Grouvelle, 1892 **(B)** **A** Ta, Toyotama-chô, Tsushima Island, Nagasaki Prefecture, Japan **B** Inamine, Nago City, Okinawa Island, Okinawa Prefecture, Japan.

## Key to species of the genus *Psammoecus* of Japan

- 1      Teeth of lateral margins of pronotum relatively short and of identical size... **2**
- Teeth of lateral margins of pronotum relatively long. Posterior teeth longer than those of anterior margins ..... **6**
- 2      1st antennomere longer than combined length of 2nd and 3rd antennomeres. Dorsolateral portions of pronotum impressed lightly ..... *boreas* sp. n.
- 1st antennomere almost as long as or shorter than combined length of 2nd and 3rd antennomeres. Dorsolateral portions of pronotum with no impressions ..... **3**
- 3      No long seta on anterolateral margins of elytra. Body oblong ..... *bipunctatus* (Fabricius, 1792)
- Some long setae on anterolateral margins of elytra ..... **4**
- 4      Distance between teeth of lateral margins of pronotum irregular *scitus* sp. n.
- Distance between teeth of lateral margins of pronotum regular ..... **5**
- 5      Parameres long. Incision of anterior margin shallow *fasciatus* Reitter, 1874
- Parameres short. Incision of anterior margin deep ..... *hiranoi* Yoshida & Hirowatari, 2013
- 6      Black elytra with yellow maculae ..... *simoni* Grouvelle, 1892
- Yellow elytra with black maculae or no maculae ..... **7**
- 7      Parameres fused with phallobase. Tooth IV of lateral margins of pronotum extended in a posterolateral direction. Antennae, especially 1st antennomere, long ..... *omotoensis* sp. n.
- Parameres and phallobase divided. Tooth IV of lateral margins of pronotum extended in a roughly lateral direction. Antennae moderately long ..... **8**
- 8      Basal parameres large. Distance between posterior margin of phallobase and deepest point of incision of anterior margin broad. Rows of punctures on elytra comparatively narrow ..... *trimaculatus* Motschulsky, 1858
- Basal parameres comparatively narrow. Rows of punctures on elytra comparatively wide ..... **9**
- 9      Distance between posterior margin of phallobase and deepest point of incision of anterior margin broad. Wide basal portion of parameres square. Punctuation of pronotal disk moderately dense ..... *labyrinthicus* sp. n.
- Distance between posterior margin of phallobase and deepest point of incision of anterior margin narrow. Wide basal portion of parameres triangular. Punctuation of pronotal disk comparatively dense ..... *triguttatus* Reitter, 1874

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# The genus *Scaphidium* Olivier in East China (Coleoptera, Staphylinidae, Scaphidiinae)

Liang Tang<sup>1,†</sup>, Li-Zhen Li<sup>1,‡</sup>, Wen-Jia He<sup>1,§</sup>

<sup>1</sup> Department of Biology, Shanghai Normal University, 100 Guilin Road, Building 1-323, Shanghai, 200234 P. R. China

† <http://zoobank.org/F45FE527-E59A-4702-A87E-B45BC33ED4C7>

‡ <http://zoobank.org/B9BB12C9-6D09-43EB-B740-1837DA69EE34>

§ <http://zoobank.org/5B1B8098-8435-47FB-B07C-CFBEFCA40B2A>

Corresponding author: Liang Tang (monkey\_zzz1980@163.com)

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## Abstract

A review of 21 species of *Scaphidium* Olivier from East China is presented, including 6 new species: *S. jinmingi* **sp. n.** (Zhejiang, Anhui, Chongqing), *S. crypticum* **sp. n.** (Zhejiang, Fujian, Jiangxi, Guangxi), *S. varifasciatum* **sp. n.** (Zhejiang, An'hui), *S. robustum* **sp. n.** (Fujian, Guizhou, Chongqing, Guangxi, Yunnan), *S. connexum* **sp. n.** (Zhejiang, Fujian, Guangxi), and *S. bayibini* **sp. n.** (An'hui). New province records for *S. comes* Löbl, *S. grande* Gestro, *S. sauteri* Miwa & Mitono, *S. formosanum* Pic, *S. carinense* Achard, *S. sinense* Pic, *S. delatouchei* Achard, *S. biwenxuani* He, Tang & Li, *S. klapperichi* Pic, *S. stigmatinotum* Löbl, *S. wuyongxiangi* He, Tang & Li, and *S. direptum* Tang & Li as well as some biological notes are reported. Habitus and diagnostic characters of all species are photographed and a key to *Scaphidium* species of East China is provided.

## Keywords

Coleoptera, Staphylinidae, Scaphidiinae, *Scaphidium*, new species, East China

## Introduction

*Scaphidium* Olivier (1790) is a large genus of the subfamily Scaphidiinae, with 338 species (including two fossil species) known world-wide (Löbl 1997 and subsequent descriptions), including 51 species from China. Our ongoing study of the Chinese *Scaphidium* reveals that the fauna of East China, which covers the Shanghai municipality and the provinces Shangdong, Jiangsu, Anhui, Zhejiang, Jiangxi and Fujian, is characteristic and of special interest. The presence of *Scaphidium* in this region is still rather unclear, and the species number has rapidly increased in recent years, pointing to inadequate collecting activities in the past. Up until the present, 13 species had been known from this region and eight of them were recorded or described in our papers since 2008. Additional specimens have been accumulated by continuous field work and these collections, in particular coming from recent trips to Anhui and Fujian, led us to review the East Chinese fauna of the genus *Scaphidium*. In addition, many collecting data based on specimens coming from other regions are used for discussing intra-specific variability and provide a better understanding of species distribution.

The collecting data suggest that the most species-rich areas in East China are Tianmushan (North Zhejiang) and Wuyishan (border of Zhejiang, Fujian and Jiangxi). Most species have been found there and especially worthy to note is Wuyishan which has two endemic species, *S. fukiense* and *S. vernicatum*. The Yaoluoping Natural Reserve in Dabieshan in West Anhui is also worth special attention: two unique species, *S. spinatum* and *S. bayibini*, are known only from there while their close relatives, *S. grande* and *S. klapperichi* are widespread.

## Material and methods

Specimens examined during the preparation of this paper were mainly collected from East China and killed with ethyl acetate. For examination of male genitalia, the last two abdominal segments were detached from the body after softening specimens in hot water. The aedeagi were mounted in Euparal (Chroma Gesellschaft Schmidt, Koenig, Germany) on plastic slides. Photos of the aedeagi were taken with a Canon G7 attached to Olympus SZX 16 stereomicroscope; photos of the antennae, front legs and habitus were taken with a Canon macro photo lens MP-E 65mm attached to a Canon EOS7D camera.

The type specimens and additional material treated in this study are deposited in the following public and private collections:

- CBWX** Private collection of Wen-Xuan BI, Shanghai, P. R. China
- CZTX** Private collection of Tie-Xiong Zhao, Zhuji, Zhejiang, P. R. China
- HBUM** Museum of Hebei University, P. R. China (Guo-Dong Ren)
- IOZ** Institute of Zoology Chinese Academy of Sciences (Hong-Bin Liang)
- MHNG** Muséum d'histoire naturelle, Geneva, Switzerland (Ivan Löbl)

<b>NHRS</b>	Naturhistoriska Riksmuseet, Stockholm, Sweden (Bert Gustafsson)
<b>NMPC</b>	Narodní Muzeum, Entomologické odd., Praha, Czech Republic (Martin Fikáček)
<b>SEM</b>	Shanghai Entomology Museum, the Chinese Academy of Science, P. R. China (X.-W. Liu)
<b>SHNU</b>	Department of Biology, Shanghai Normal University, P. R. China (Liang Tang)
<b>SYSU</b>	Sun Yat-Sen University, Guangzhou, P. R. China (Feng-Long Jia)
<b>TARI</b>	Taiwan Agricultural Research Institute, Wufeng, Taichung, Taiwan (Chi-Feng Lee)

The abbreviation **BL** is used for the body length, measured from the anterior margin of the clypeus to the apex of the abdomen.

## Taxonomy

### *Scaphidium jinmingi* sp. n.

<http://zoobank.org/F0FFD88F-6CB7-4E04-87FB-C49286D55880>

[http://species-id.net/wiki/Scaphidium\\_jinmingi](http://species-id.net/wiki/Scaphidium_jinmingi)

Figs 1, 2, 58–61

**Type material. Holotype. Zhejiang:** ♂, Lin'an City, West Tianmushan, alt. 1400 m, 10.VII.2008, Y.-X. Wu & M. Jin leg. "Holotype / *Scaphidium jinmingi* / Tang & Li" [red handwritten label] (SHNU). **Paratypes. Zhejiang:** 3♂♂3♀♀, same data as the holotype (1 pair in MHNG, remaining in SHNU); 2♂♂1♀, Anji County, Longwangshan, N 30°24', E 119°21', alt. 1200–1500m, 8.IV.2012, Bi, Hu & Yin leg. (1♂ in CBWX, remaining in SHNU); 2♀♀, Lin'an City, West Tianmushan, alt. 1500 m, 17–18.V.2008, W.-X. Bi leg. (SHNU); 1♂3♀♀, Anji County, Longwangshan, N 30°23', E 119°26', alt. 1450m, 14.V.2013, C.-C. Dai leg. (SHNU). **Anhui:** 3♂♂2♀♀, Yuexi County, Yaoluoping N. R., Duozhijian, N30°58'38", E116°6'59", alt. 1650m, 19.VI.2013, Dai & Peng leg. (SHNU). **Chongqing:** 1♂, Chengkou County, East Daba Shan, lower Huang'an Gou, N31°51'227", E109°7'174", alt. 2039m, 22–23. IV.2008, H. Huang & W. Xu leg. (SHNU).

**Description.** BL: 4.1–4.8 mm.

Body black with distinct blue to violet metallic luster, labrum light brown, antennal club (Fig. 60) blackish, tarsi dark brown.

Frons coarsely and densely punctate, punctures near inner side of eyes relatively small and a little confluent.

Pronotum slightly raised above elytra. Antebasal puncture row impressed, not interrupted at middle, with punctures very coarse and more or less longitudinal; discal punctation almost evenly coarse and rather dense, consisting of deep punctures, a little coarser than those on frons, puncture intervals mostly 0.8 to 1.5 times as large as their diameters.

Elytra with sides relatively parallel. Disc slightly impressed apically, basal and sutural stria rows impressed; discal punctation similar to that of pronotum, punctures



**Figures 1–4.** Habitus of *Scaphidium*. **1, 2** *S. jinmingi* **3, 4** *S. jizuense* (Holotype). Scales = 1 mm.

coarse on middle portion and less coarse on lateral portion and near suture; discal puncture row absent; basal stria row with punctures about as coarse as those forming pronotal antebasal row, sutural stria puncture row relatively fine.

Prohypomera slightly uneven, with fine and very sparse punctures, without microsculpture.

Mesepisterna with very fine and sparse punctures.

Abdominal tergites with relatively coarse and dense punctures. Sternite III with dense micropunctures on basal half and lateral portions, remaining sternites with dense micropunctures only on lateral parts. Reticular microsculpture appearing rarely and irregularly on sternites.

Legs relatively short, mesotibiae and metatibiae slightly curved.

Male. Metaventrite (Fig. 2) as in female, without setiferous patch. Protibiae (Fig. 61) with ventral side weakly expanded at apical 1/4 forming a tiny blunt angle. Segments 1 to 3 of protarsi widened with dense pubescence on ventral side. Median lobe of aedeagus (Fig. 58) with sclerotized internal sac (Fig. 59) consisting of two apical sclerotized rods and subapical transverse sclerite.

**Distribution.** China (Zhejiang, Anhui, Chongqing).

**Remarks.** The new species is unique within Chinese *Scaphidium* by the male metaventrite lacking a setiferous patch. The new species is very similar to *S. jizuense* Löbl, 1999 from Yunnan and *S. cyanellum* Oberthür, 1884 from Nepal and India in general appearance. It can be distinguished from *S. jizuense* by a stouter terminal antennal segment, less distinct blunt angle of the male protibiae, prohypomera without microsculpture, and with fine punctures (in *S. jizuense* prohypomera are microsculptured and without punctures), from *S. cyanellum* by the stouter terminal antennal segment and the coarser elytral punctation.

**Etymology.** This species is named in honor of Mr. Ming Jin, who firstly collected specimens of the new species.

### ***Scaphidium comes* Löbl, 1968**

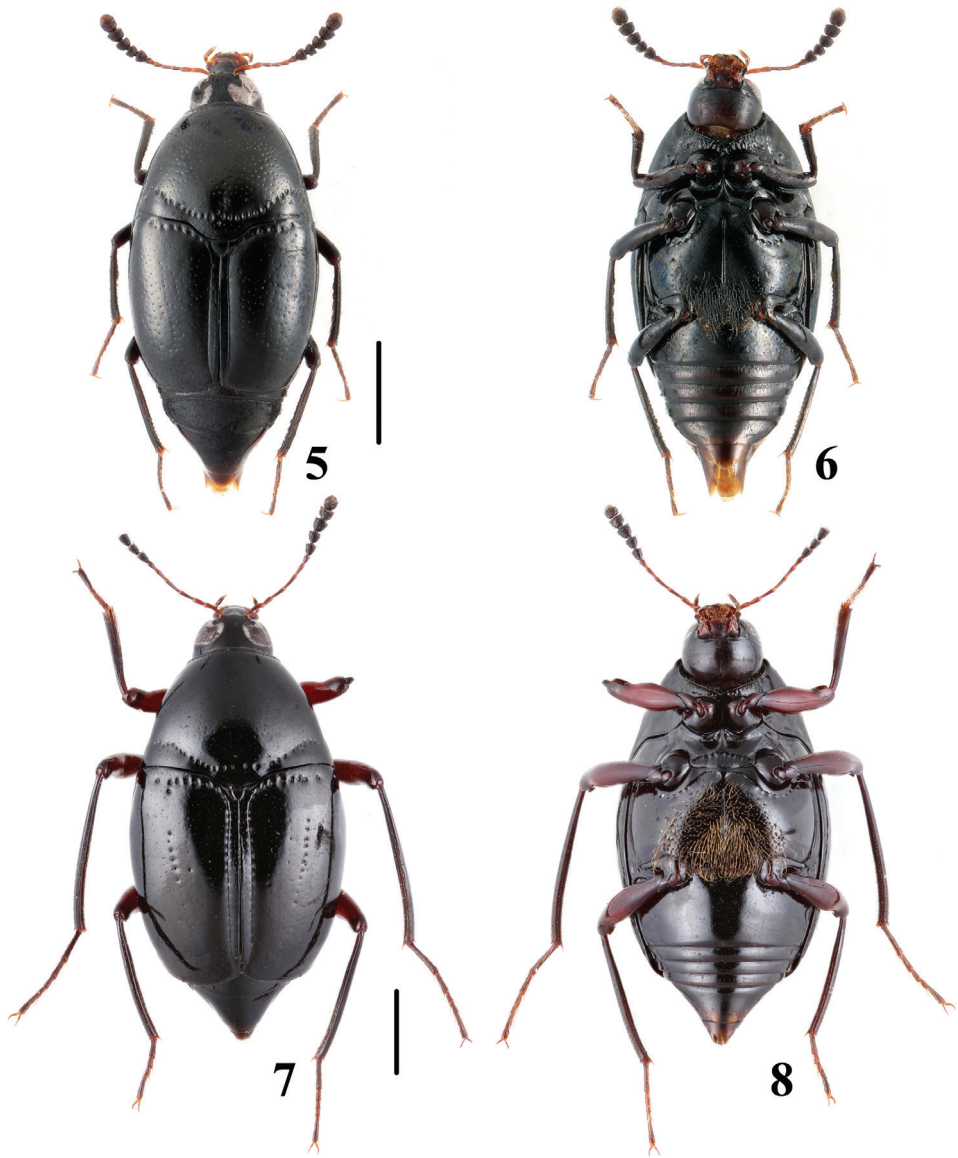
[http://species-id.net/wiki/Scaphidium\\_comes](http://species-id.net/wiki/Scaphidium_comes)

Figs 5, 6, 62–65, 142–144

*Scaphidium comes* Löbl, 1968: 388; He et al. 2008a: 181.

**Material examined.** **Zhejiang:** 1♂5♀♀, Lin'an City, West Tianmushan, alt. 350m, 1.V.2006, Y.-X. Wu leg. (SHNU); 1♂2♀♀, same locality but alt. 300m, 29.V.2008, Huang & Yan leg. (SHNU). **Hunan:** 4♂♂6♀♀, Xiangtan City, Zhaoshan County, 30.I.2011, Z. Peng leg. (SHNU). **Hubei:** 1♂1♀, Wufeng County, Houhe N. R., N30°5'7", E110°33'11", 9.VII.2013, Dai, Peng & Xie leg. (SHNU). **Guangxi:** 6♂♂7♀♀, Shangsi County, Shiwandashan N. R., 300–400m, 23.IV.2011, Zhai, Peng & Zhu leg. (SHNU). **Hainan:** 1♂, Baishan County, Yinggeling N. R., 3.XII.2007, G.-Y. Yang leg. (SHNU)





**Figures 5–8.** Habitus of *Scaphidium*. **5, 6** *S. comes* **7, 8** *S. fukiense*. Scales = 1 mm.

**Distribution.** China (Zhejiang, Hunan, Hubei, Guangxi, Hainan), North Korea.

**Remarks.** These are new records to Hunan, Hubei, Guangxi and Hainan. The species is similar to *S. jinmingi*, but it can be easily recognized by the entirely black coloration which is metallic blue in *S. jinmingi*. The coloration of the femora is variable, being reddish in a few specimens from Zhejiang and more than half of the specimens from Hunan.

***Scaphidium fukiense* Pic, 1954**

[http://species-id.net/wiki/Scaphidium\\_fukiense](http://species-id.net/wiki/Scaphidium_fukiense)

Figs 7, 8, 66–69

*Scaphidium fukiense* Pic, 1954: 58; Löbl 2009: 710.

**Material examined. Lectotype. Fujian:** 1♂, Kuatun, 1.VIII.1946. (NHRS).

**Other material. Fujian:** 1♂2♀♀, Wuyishan City, Guadun Vil., N27°44', E117°38', alt. 1200–1300m, 24.V.2012, Dai, Peng & Song leg. (SHNU).

**Distribution.** China (Fujian).

**Remarks.** The species is similar to *Scaphidium biseriatum* Champion, 1927 and its allies, but can be distinguished from them by the smaller body size and the reddish femora. It is possibly endemic to Wuyishan.

***Scaphidium grande* Gestro, 1879**

[http://species-id.net/wiki/Scaphidium\\_grande](http://species-id.net/wiki/Scaphidium_grande)

Figs 9, 10, 70–73, 145–150

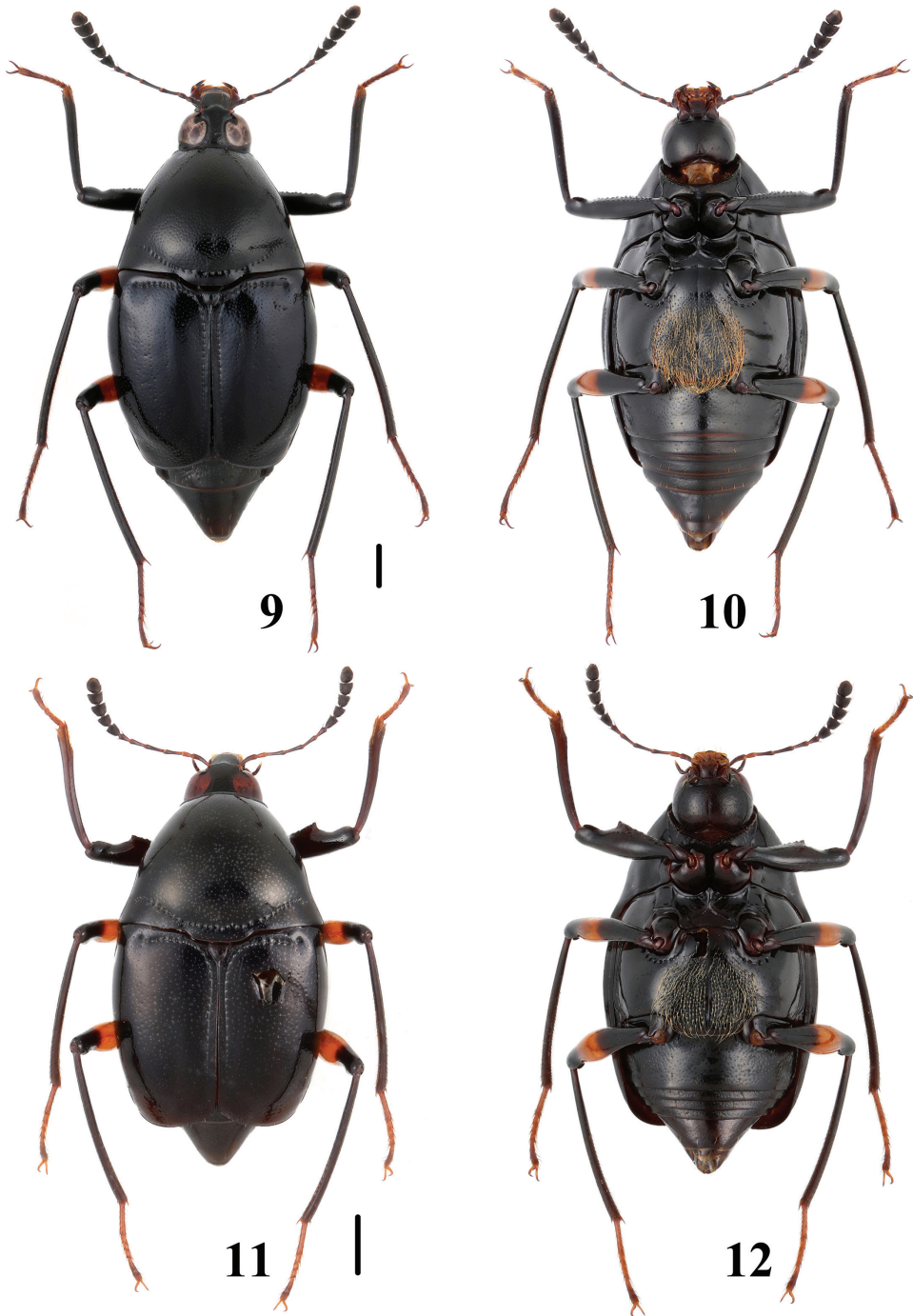
*Scaphidium grande* Gestro, 1879: 50; Pic 1915: 3; Pic 1920: 189; Achard 1924: 91; Löbl 1992: 488; He et al. 2008a: 181; Tang and Li 2010a: 68.

*Scaphidium grande* var. *inimpressum* Pic 1920: 189; Löbl 1992: 488.

*Scaphidium grande* var. *subannulatum* Pic 1915: 3; Löbl 1992: 488.

*Scaphidium grande* var. *melanopus* Achard, 1924: 91; Löbl 1992: 488.

**Material examined. Chongqing:** 1♂, Jiangjin, Simianshan, 10.VII.2005, W.-W. Zhang leg. (SHNU). **Sichuan:** 1♀, Luding, Moxi, alt. 1300m, 20.V.2009, W.-J. He leg. (SHNU). **Guizhou:** 1♀, Fanjingshan, Heiwan Reiver, 800m, 3.VIII.2001, Dong leg. (IOZ). **Hunan:** 1♀, Tongdao County, Shangyan, 24.VII.2004, J.-L. Wang (HBUM); 3♂♂2♀♀, Yanling County, Taoyuandong Park, N26°29'14", E114°0'42", alt. 770m, Dai, Peng & Xie leg. (SHNU). **Zhejiang:** 1♂1♀, Kaihua County, Gutianshan, N29°15', E118°7', alt. 770m, 16.VII.2013, Dai, Peng & Xie leg. (SHNU). **Fujian:** 1♂, Yong'an County, Xiyang, 19.IV.1962, G.-Y. JIN leg. (NO. 24110832, SEM); 1♀, Fuzhou City, Shoushan, Beifeng, V.2004, M. Li leg. (SHNU); 1♀, Wuyishan, 27.V.2002, Li Li- Zhen leg. (SHNU); 2♀♀, Wuyishan City, Guadun, N27°44', E117°38', alt. 1000–1300m, 29–30.V.2012, Song, Peng & Dai leg. (SHNU). **Guangdong:** 1♂, Nanxiong City, Yuntan street, 3.V.2007, B.-P. Huang leg. (SHNU). **Yunnan:** 1♂, Menla, alt. 670m, 21.IV.1982, Yu leg. (SHNU); 1♂, Jinghong City, 11.VI.1973, G.-T. Jin leg. (NO. 24038143, SEM); 1♂, Jinghong City, Nabanhe N. R., Manfei, alt. 630 m, 29.VII.2005, LI & LI leg. (SHNU); 1♂1♀, Menlun, Xipian, alt. 985m, 1.IV.2009, W.-X. Bi leg. (SHNU); 1♂1♀, Menla, Wangtianshu, alt. 600m, 5.IV.2009, W.-X. Bi leg. (SHNU); 1♀, Menla, Nanman Vil., alt. 900m, 7.IV.2009, W.-X. Bi leg. (SHNU); 2♂♂, Xishuangbanna botanical garden, 20.IV.2010, X.-Y.



**Figures 9–12.** Habitus of *Scaphidium*. **9, 10** *S. grande* **11, 12** *S. spinatum*. Scales = 1 mm.

Zhu leg. (SHNU). **Guangxi:** 1♂, Rong'an County, Xishan Forest Farm, Hongchagou, 26.VII.2006, Yang leg. (SHNU); 1♀, Shangsi County, Pinglongshan, 6.IV.2002, alt. 350–500m, A.-M. Shi leg. (HBUM); 7♂♂9♀♀, Shangsi County, Shiwandashan, alt. 300–500m, 23–25.IV.2011, Zhai, Peng & Zhu leg. (SHNU); 13♂♂7♀♀, Xing'an County, Mao'ershan, Gaozhai, alt. 440m, 7.8.VII.2011, He, Tang, Peng, Ma, Chen & Zhu leg. (SHNU); 2♂♂4♀♀, Jinxiu County, Yinshan Bohuzhan, alt. 1200m, 22–27.VII.2011, Peng, Hu & Yin leg. (SHNU); 2♀♀, Jinxiu County, Shengtangshan, alt. 700–900m, 28–29.VII.2011, Z. Peng leg. (SHNU) **Hainan:** 1♀, Lingshui County, Diaoluoshan, 1100m, 29.III.1999, W.-Y. Zhou leg. (SHNU); 1♂, Wuzhishan City, Shuiman, 23–25. May.2007, Ba & Lang leg. (HBUM); 1♂, Limushan, alt. 800m, 20.IV.2009, X.-Y. Zhu leg. (SHNU); 6♂♂3♀♀, Linshui County, Diaoluoshan, alt. 1000m, 18–23.IV.2010, Z.-W. Yin leg. (SHNU); 2♂♂2♀♀, Changjiang County, Bawangling, alt. 1000m, 10.IV.2010, B.-P. Huang leg. (SHNU); 2♂♂3, Ledong County, Jianfengling, alt. 1000m, 17–24.V.2011, W.-X. Bi leg. (SHNU).

**Distribution.** China (Chongqing, Sichuan, Guizhou, Hunan, Zhejiang, Fujian, Guangdong, Yunnan, Guangxi, Hainan, Taiwan?), Nepal, Myanmar, Thailand, Laos, Malaysia, Vietnam, Indonesia.

**Remarks.** This is new record to Zhejiang. The species is one of the most widely distributed species in China while its relatives are restricted to rather smaller areas. The main differences between these species affect the male characters (see Tang and Li 2010a). The Taiwanese records of the species are based on *Scaphidium grande* var. *inimpressum* Pic which was synonymized by Löbl in 1992. Several specimens in our collection from Taiwan are considered to be a closely related species of *S. grande*, and this might imply that *S. grande inimpressum* Pic is a good species. To clarify the doubt, a study on the type material of *S. grande inimpressum* Pic and more related material from Taiwan will be necessary; the distribution of *S. grande* in Taiwan is now doubtful.

### *Scaphidium spinatum* Tang & Li, 2010

[http://species-id.net/wiki/Scaphidium\\_spinatum](http://species-id.net/wiki/Scaphidium_spinatum)

Figs 11, 12, 74–77, 163

*Scaphidium spinatum* Tang & Li, 2010a: 70.

**Material examined. Holotype. Anhui:** ♂, Yuexi County, Yaoluoping Vil., 17.VII.2007–4.VIII.2007, Ba, Lang & Wang leg. (HBUM). **Paratypes.** 6♂♂12♀♀, same data as for the holotype (1♂1♀ in SHNU, remaining in HBUM).

**Other material. Anhui:** 3♂♂9♀♀, Yuexi County, Yaoluoping, alt. 1050–1650m, 17–21.VI.2013, Dai & Peng leg. (SHNU).

**Distribution.** China (Anhui).

**Remarks.** The species can be distinguished from its allies by a spine on the male profemur.

***Scaphidium crypticum* sp. n.**

<http://zoobank.org/DF2BCA13-FB3A-4656-A697-36F1906E4191>

[http://species-id.net/wiki/Scaphidium\\_crypticum](http://species-id.net/wiki/Scaphidium_crypticum)

Figs 13–16, 78–81, 151, 152

**Type material. Holotype.** Zhejiang: ♂, Longquan City, Fengyangshan, alt. 1100 m, 5.VI.2008, W.-X. Bi leg. “Holotype / *Scaphidium crypticum* / Tang & Li” [red handwritten label] (SHNU). **Paratypes.** Zhejiang: 3♂♂, same data as for the holotype (SHNU); 1♀, Qingyuan County, Baishanzu, 8.VII.2009, Z.-W. Yin leg. (SHNU). **Fujian:** 2♂♂3♀♀, Wuyishan City, Guadun Vil., N27°44', E117°38', alt 1100–1500m, 25–29.V.2012, Peng & Dai leg. (1 pair in MHNG, remaining in SHNU); 1♂, Wuyishan City, Guadun Vil., N27°44'27", E117°37'57", alt 1200–1300m, 29.V.2012, X.-B. Song leg. (SHNU). **Jiangxi:** 2♂♂1♀, Yichun City, Fengxin County, Baizhang Vil., N28°41'18", E114°46'13", alt. 840–860m, 15.VII.2013, Hu & Lv leg. (SHNU). **Guangxi:** 1♂, Shangsi County, Shiwandashan, alt. 300–500m, 4.V.2011, L. Tang leg. (SHNU); 1♀, Lingui County, Huaping N. R., alt. 1200m, 13.VII.2011, Z. Peng leg. (SHNU); 1♀, Jinxiu County, 16km away, alt. 900m, 29.VII.2011, Z. Peng leg. (SHNU).

**Description.** BL: 4.4–5.1 mm.

Body reddish-yellow. Frons with a triangular blackish median fascia (Fig. 16) on vertex. Antennal club (Fig. 80) blackish with terminal segment slightly lighter in basal 2/3 and distinctly lighter in apical 1/3. Pronotum with two longitudinal black fasciae. Each elytron with one small black humeral spot, one large black median fascia and blackish suture. Prohypomera blackish along the inner side. Prosternum, mesoventrite and metaventrite black. Abdominal sternite III widely black on median portion. Trochanter more or less blackish. Femora blackish except ventral side reddish yellow. A specimen from Guangxi (Fig. 15) with slightly variable coloration: prohypomera and prosternum yellow, mesoventrite and trochanter reddish, femora yellow.

Frons finely and sparsely punctate, punctures of vertex coarser than those on remaining surface.

Pronotum slightly raised above elytra. Antebasal puncture row impressed, interrupted at middle, with punctures coarse and regular; discal punctation similar to that of vertex, intervals as broad as 1.5 to 2 puncture diameter.

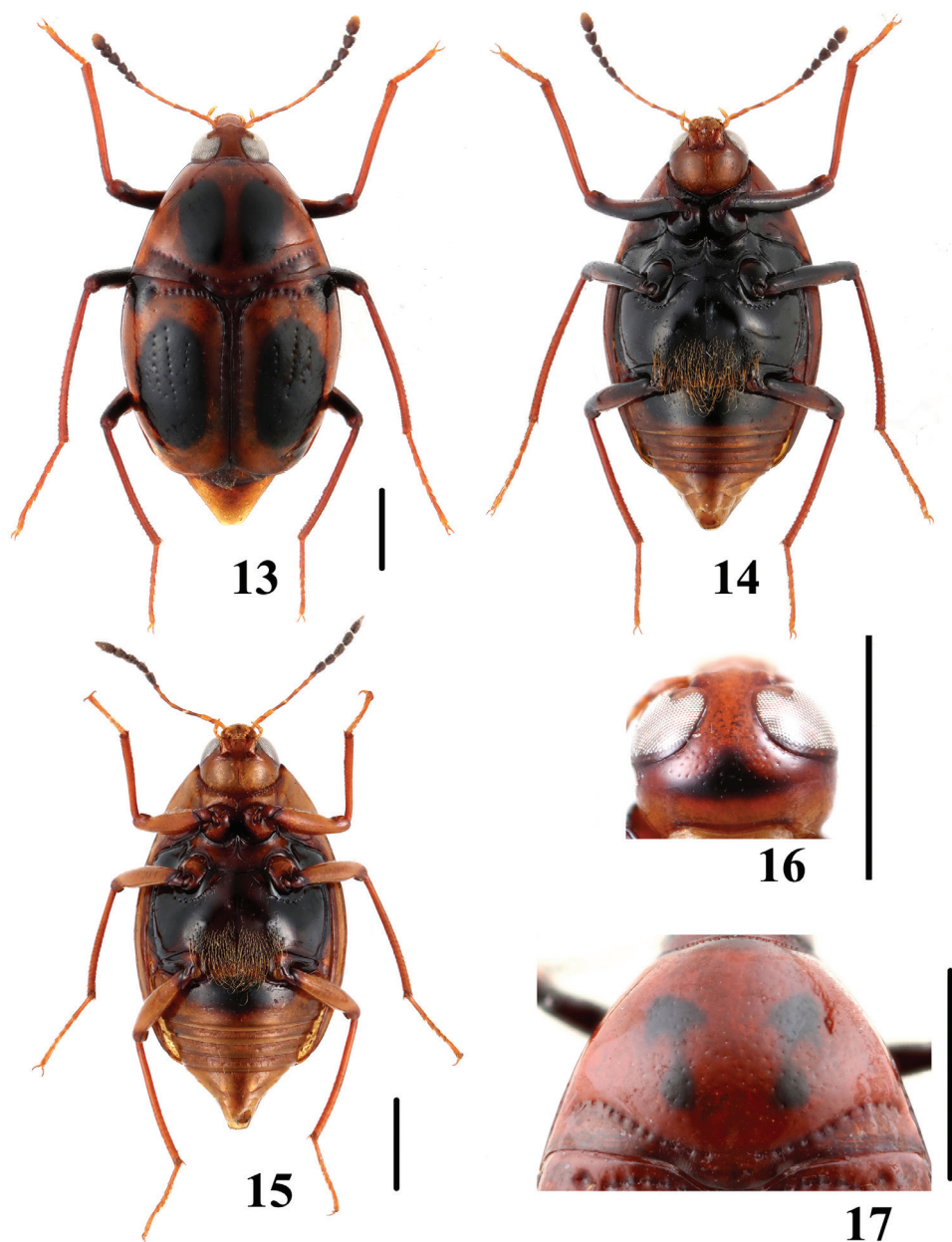
Elytra with disc slightly impressed apically, basal and sutural stria rows impressed; discal punctation similar to that of pronotum except that on apical impression which is very coarse and dense; each elytron with 3 long discal puncture rows consisting of very coarse punctures, 1<sup>st</sup> row more or less indistinct, 2<sup>nd</sup> and 3<sup>rd</sup> rows distinct; basal stria row with punctures slightly coarser than those forming pronotal antebasal row, sutural stria puncture row relatively fine.

Prohypomera slightly uneven, with moderately coarse and very shallow punctures.

Mesepisterna finely, sparsely and very shallowly punctate.

Abdominal tergites with relatively fine and sparse punctures. Sternite III with distinct micropunctures on median portions, remaining sternites on basal half with dense microsculpture consisting of micropunctures.





**Figures 13–17.** *Scaphidium* spp. **13, 14** habitus of *S. crypticum* (Zhejiang) **15** habitus of *S. crypticum* (Guangxi) **16** head of *S. crypticum* **17** pronotum of *S. varifasciatum*. Scales = 1 mm.

Legs relatively long, mesotibiae and metatibiae moderately curved.

Male. Metaventrite (Fig. 14) impressed at middle, with long and suberect pubescence. Protibiae (Fig. 81) almost straight with small tubercles along ventral sides.



Median lobe of aedeagus (Fig. 78) with sclerotized internal sac (Fig. 79) consisting of two apical sclerotized rods, x-shaped median sclerite and two basal sclerotized rods.

**Distribution.** China (Zhejiang, Fujian, Jiangxi, Guangxi).

**Remarks.** The species is similar to *S. biwenxuani* in its fascia pattern, but can be distinguished from the latter by the elytra lacking the inner basal black dot and the posterior portion of the head in having a black spot.

**Etymology.** The Latin adjective “crypticum” means mysterious.

***Scaphidium varifasciatum* sp. n.**

<http://zoobank.org/73435331-5B55-4AFC-A858-DAB6CABA2F1A>

[http://species-id.net/wiki/Scaphidium\\_varifasciatum](http://species-id.net/wiki/Scaphidium_varifasciatum)

Figs 17–19, 82–85

**Type material. Holotype.** Zhejiang: ♂, Lin'an City, West Tianmushan, alt. 1000 m, 18.VIII.2011, L. Tang leg. “Holotype / *Scaphidium varifasciatum* / Tang & Li” [red handwritten label] (SHNU). **Paratypes.** Zhejiang: 2♂♂2♀♀, same data as for the holotype (1 pair in MHNG, remaining in SHNU); 1♂, Anji City, Longwangshan, N30°27', E119°26', alt. 300–500m, 7.VI.2012, Hu & Yin leg. (SHNU); 1♂, Anji City, Tonghanggang, N30°24', E119°26', alt. 1480m, 10.VI.2012, J.-Q. Zhu leg. (SHNU). **Anhui:** 1♂, Yuexi County, Yaoluoping N. R., Ximianzi Vil., N30°58'55", E116°3'49", alt. 1050m, 21.VI.2013, Dai & Peng leg. (SHNU).

**Description.** BL: 3.7–4.6 mm.

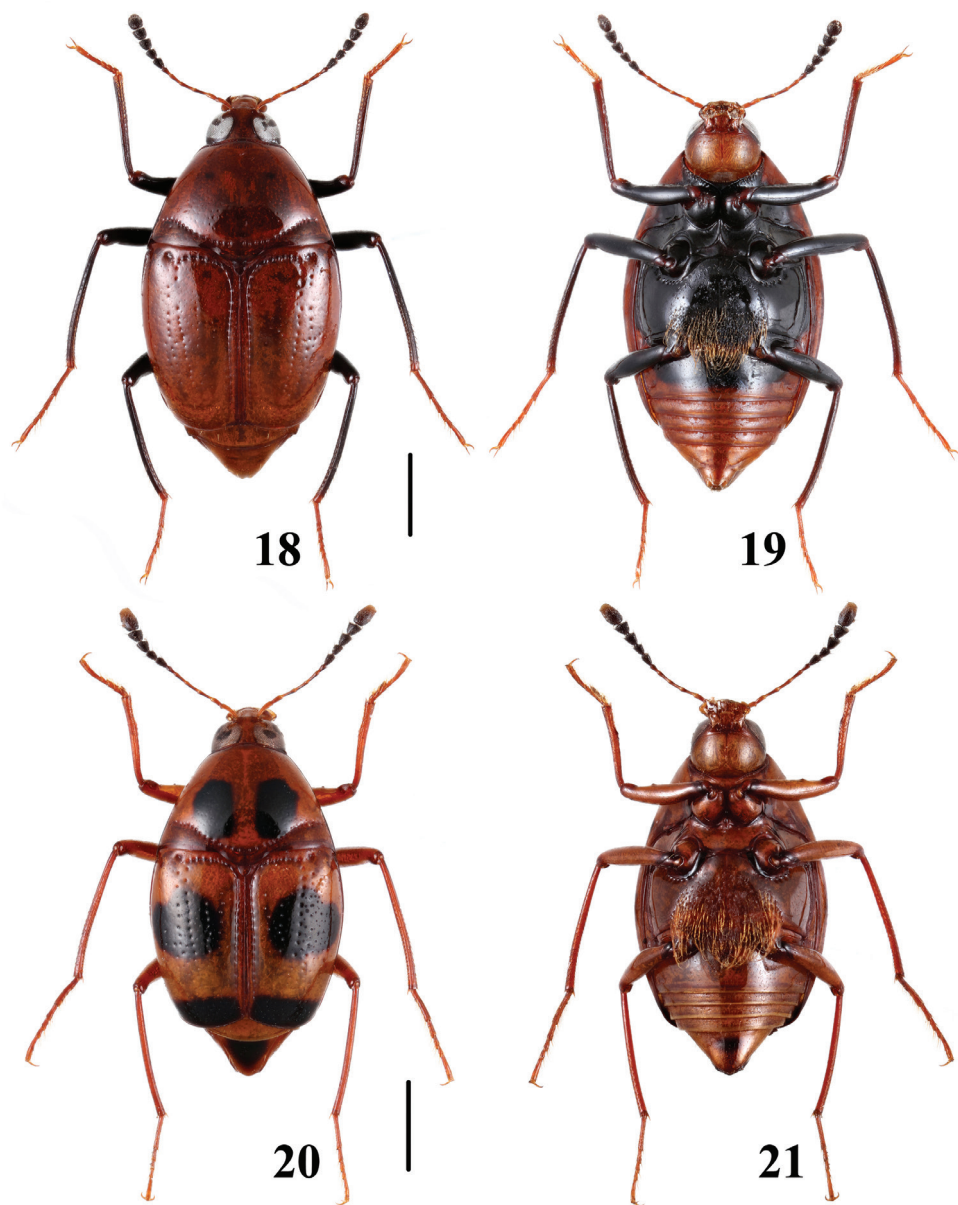
Body reddish. Antennal club (Fig. 84) blackish with terminal segment slightly lighter in basal half and distinctly lighter in apical half. Pronotal fasciae variable, with pair of faint dots (Fig. 18) to two pairs of black dots, the apical dots sometimes connected to basal dots by black stripe (Fig. 17). Inner halves of prohypomera blackish. Prosternum, mesoventrite and metaventrite black. Abdominal sternite III widely black on median portion. Trochanters more or less blackish. Femora varied from reddish-brown to blackish and tibia varied from reddish to dark brown.

Frons finely and sparsely punctate, punctures on vertex coarser than those on remaining surface.

Pronotum slightly raised above elytra. Antebasal puncture row impressed, interrupted at middle, with punctures coarse and regular; discal punctation similar to that of vertex, puncture intervals as broad as 1.5 to 3 puncture diameter.

Elytra with disc slightly impressed apically, basal and sutural stria rows impressed; discal punctation similar to that of pronotum except that on apical impression which is very coarse and dense; each elytron with 3 long discal puncture rows consisting of very coarse punctures, 1<sup>st</sup> row short and more or less indistinct, 2<sup>nd</sup> and 3<sup>rd</sup> rows long and distinct, rarely the presence of an additional row between 1st row and sutural stria rows may be recognized; basal stria row with punctures slightly coarser than those forming pronotal antebasal row, sutural stria puncture row relatively fine.

Prohypomera slightly uneven, with few indistinct punctures on posterior portion.



**Figures 18–21.** Habitus of *Scaphidium*. 18, 19 *S. varifasciatum* 20, 21 *S. sauteri*. Scales = 1 mm.

Mesepisterna smooth.

Abdominal tergites with relatively fine and sparse punctures. Sternite III with distinct micropunctures on median portions, remaining sternites on basal half with dense microsculpture consisting of micropunctures.

Legs relatively long, mesotibiae and metatibiae moderately curved.

Male. Metaventricle (Fig. 19) impressed at middle, with long and suberect pubescence. Protibiae (Fig. 85) almost straight with small tubercles along ventral sides. Median lobe of aedeagus (Fig. 82) with sclerotized internal sac (Fig. 83) consisting of two apical sclerotized rods, x-shaped median sclerite and two basal sclerotized rods.

**Distribution.** China (Zhejiang, Anhui).

**Remarks.** The species is distinctive for its unique coloration.

**Etymology.** The Latin adjective “varifasciatum” refers to the variable fasciae of the pronotum.

### *Scaphidium sauteri* Miwa & Mitono, 1943

[http://species-id.net/wiki/Scaphidium\\_sauteri](http://species-id.net/wiki/Scaphidium_sauteri)

Figs 20, 21, 86–89

*Scaphidium sauteri* Miwa & Mitono, 1943: 529.

**Material examined.** **Fujian:** 1♂1♀, Wuyishan City, Guadun Vil., N27°43'59", E117°39'3", alt. 1000–1100m, 27.V.2012, X.-B. Song leg. (SHNU); 1♂: ibidem, N27°44'25", E117°38'9", alt. 1200–1300m, 26.V.2012, X.-B. Song leg. (SHNU). **Anhui:** 1♀, Yuexi County, Yaoluoping N. R., Ximianzi Vil., N30°58'55", E116°3'49", alt. 1050m, 21.VI.2013, Dai & Peng leg. (SHNU). **Zhejiang:** 1♂, Kaihua County, Gutianshan, N29°14', E118°6', alt. 320m, 20.V.2013, J.-Y. Hu leg. (SHNU); ibidem, N29°14', E118°8', alt. 400–500m, 19.VI.2013, Lv & Xie leg. (SHNU). **Jiangxi:** 1♂3♀♀, Jinggangshan City, Ciping, alt. 850m, 18.X.2010, Peng, Zhai & Zhu leg. (SHNU). **Guangdong:** 1♀, Shaoguan City, Ruokeng, 30.VIII.2008, B.-P. Huang leg. (SHNU). **Guangxi:** 1♀, Lingui County, Huaping N. R., 28.X.2009, Y. Liu leg. (SHNU); 1♀, Lingui County, Huaping N. R., Anjiangping, alt. 1200m, 13.VII.2011, Z. Peng leg. (SHNU)

**Distribution.** China (Zhejiang, Anhui, Fujian, Jiangxi, Guangdong, Guangxi, Taiwan).

**Remarks.** The type depository of the species is TARI and the photo of the type specimen was sent to us by Dr. Chi-Feng Lee. Each pronotal fascia of the type extends to lateral side basally along the antebasal puncture row, which is absent in specimens from mainland China; this is temporarily considered as intra-specific variability. In the habitus photo, there is a black spot on the vertex similar to that in Fig. 16, which is covered by the pronotum.

### *Scaphidium formosanum* Pic, 1915

[http://species-id.net/wiki/Scaphidium\\_formosanum](http://species-id.net/wiki/Scaphidium_formosanum)

Figs 22–25, 90–93

*Scaphidium formosanum* Pic, 1915a: 36; Löbl 1999: 708.

**Material examined.** **Jiangxi:** 1♀, Kiangsi, 1929, J Sedlacek Collection (MHNG). **Fujian:** 1♀, Wuyishan City, Guadun Vil., N27°43'1", E117°39'26", alt. 1000–1100m, 31.V.2012, X.-B. Song leg. (SHNU). **Guangdong:** 1♀, Ruyuan County, Nanling N. R., alt. 1050m, 15.VII.2012, L. Ning leg. (SHNU). **Yunnan:** 1♀, Baoshan City, Baihualing, N25°16'46", E98°47'20", alt. 1350–1450m, 22.IV.2013, Peng & Dai leg. (SHNU). **Guangxi:** 1♂, Shangsi County, Shiwandashan N. R., alt. 300–700m, 24.IV.2011, Zhai, Peng & Zhu leg. (SHNU); 3♂♂2♀♀, Jinxiu County, Shengtangshan, alt. 700m, 28.VII.2011, Z. Peng leg. (SHNU); 1♂, Damingshan, N23°23', E108°29', alt. 1200–1300m, 30.VII.2012, Hu & Song leg. (SHNU). **Taiwan:** 1♂, Fuliosha, 09.VIII. (NMPC). **Hainan:** 1♂1♀, Changjiang County, Bawangling, alt. 1000m, 10.IV.2010, B.-P. Huang leg. (SHNU); 6♂♂1♀, Ledong County, Jianfengling N. R., alt. 1000m, 18.V.2011, W.-X. Bi leg. (SHNU); 1♂1♀, Wuzhishan City, Shuiman, Wuzhishan, alt. 700m, 18.IV.2012, Peng & Dai leg. (SHNU); 9♂♂1♀, Ledong County, Jianfengling N. R., Mingfenggou, N18°44', E108°50', alt. 950m, 29.IV.2012, Peng & Dai leg. (SHNU)

**Distribution.** China (Jiangxi, Fujian, Guangdong, Yunnan, Guangxi, Hainan, Taiwan).

**Remarks.** These are new province records to Fujian, Guangdong, Yunnan, Guangxi, Hainan. Specimens from Hainan (Figs 24, 25) have smaller black marks, especially on the ventral side and legs, the second inner black spot is absent in approximately half of the specimens. However, no differences are found in sexual characters, suggesting that the Hainan population may represent a new subspecies. The species is very similar to *S. baconi* Pic, 1915 (see Pic 1915b) distributed in Nepal, India, Thailand, and Vietnam. Reliable distinguishing characters between them are unknown, and the validity of *S. baconi* is suspicious. The species is also similar to *S. carinense* Achard; for differences see remarks below.

### *Scaphidium carinense* Achard, 1920: 239

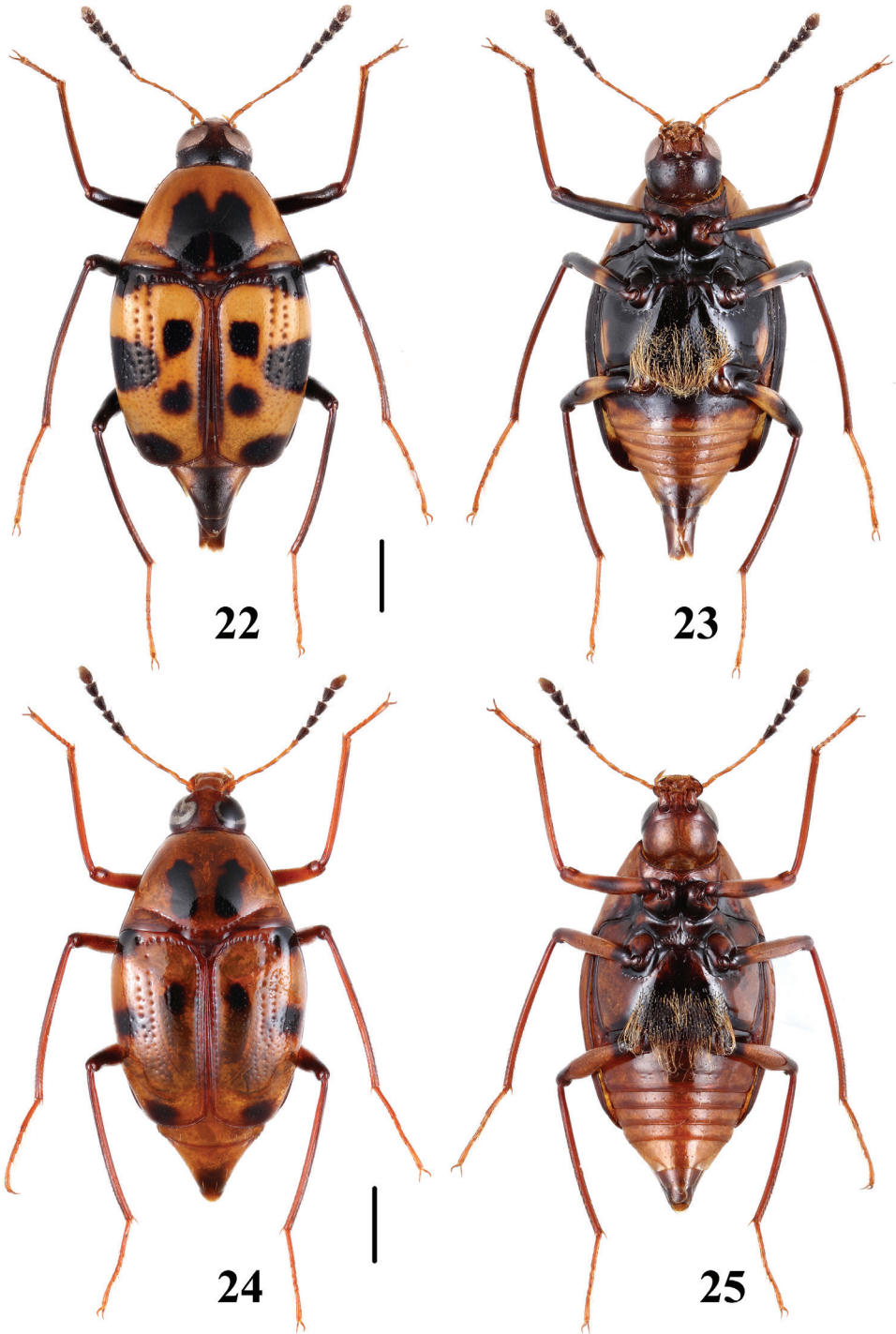
[http://species-id.net/wiki/Scaphidium\\_carinense](http://species-id.net/wiki/Scaphidium_carinense)

Figs 26, 27, 94–97, 153

*Scaphidium carinense* Achard, 1920a: 239; Tang and Li 2013: 174.

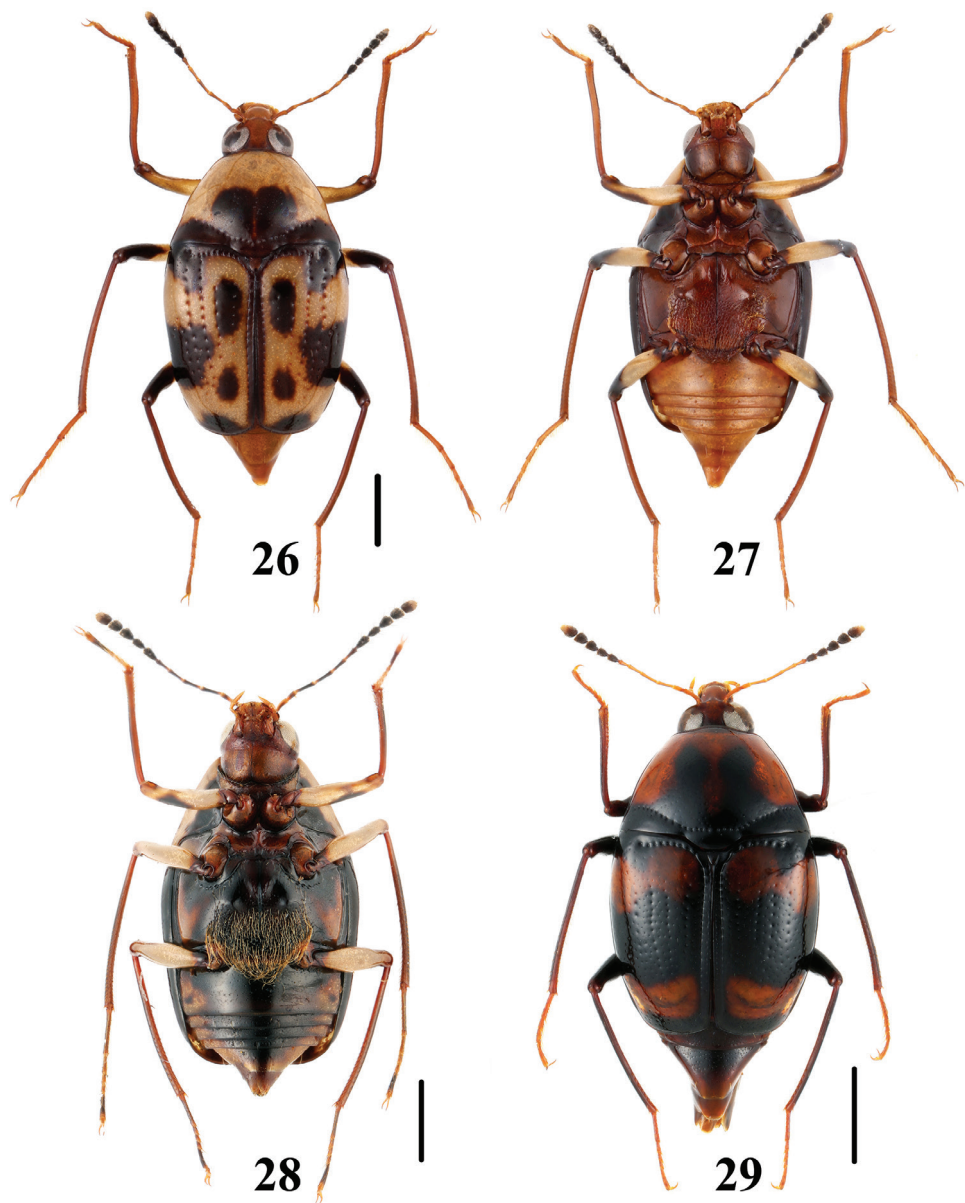
**Material examined. Lectotype.** Myanmar: ♀, Carin Cheba. (NMPC).

**Other material.** **Hubei:** 2♂♂5♀♀, Wufeng County, Houhe N. R., N30°5'7", E110°33'11", alt. 1200m, 9.VII.2013, Dai, Peng & Xie leg. (SHNU). **Fujian:** 12♂♂8♀♀, Guadun, Wuyishan, N27°44', E117°38', alt. 1000–1400m, 26–29.V.2012, Peng, Dai & Song leg. (SHNU). **Sichuan:** Shimian County, Liziping, Zima Vil., N28°59', E102°16', alt. 1800m, 16.VII.2012, Peng, Dai & Yin leg. (SHNU). **Guangxi:** 56♂♂17♀♀, Lingui County, Huaping N. R., Anjiangping, alt. 1200–1300m, 13–18.VII.2011, Z. Peng leg. (SHNU); 16♂♂5♀♀, Jinxiu County, 16km away, alt. 900m, 29–31.VII.2011, Z. Peng leg. (SHNU); 10♂♂6♀♀, Shangsi County, Shiwandashan, alt. 300–700m,



**Figures 22–25.** Habitus of *Scaphidium formosanum*. **22, 23** (Guagnxi) **24, 25** (Hainan). Scales = 1 mm.





**Figures 26–29.** Habitus of *Scaphidium*. **26–28** *S. carinense* **29** *S. sinense* (Zhejiang). Scales = 1 mm.

24.25.IV.2011, Zhai, Peng & Zhu leg. (SHNU). **Yunnan:** 10♂♂3♀♀, Menla, Wangtianshu, alt. 600m, 6.VI.2009, Wen-Xuan Bi leg. (SHNU). **Hainan:** 2♂♂5♀♀, Lingshui County, Diaoluoshan, N18°43', E109°51', alt. 1000m, 24.IV.2012, Peng & Dai leg. (SHNU); 13♂♂12♀♀, Wuzhishan City, Wuzhishan, N18°44', E108°50', alt. 950m, 29.IV.2012, Peng & Dai leg. (SHNU).

**Distribution.** China (Hubei, Fujian, Sichuan, Guangxi, Yunnan, Hainan), Myanmar.

**Remarks.** This is a new province record to Hubei. The species is similar to *S. formosanum* Pic and can be distinguished from the latter by its elytra bearing two additional inner puncture rows between the long outer puncture rows and the sutural puncture row.

***Scaphidium sinense* Pic, 1954**

[http://species-id.net/wiki/Scaphidium\\_sinense](http://species-id.net/wiki/Scaphidium_sinense)

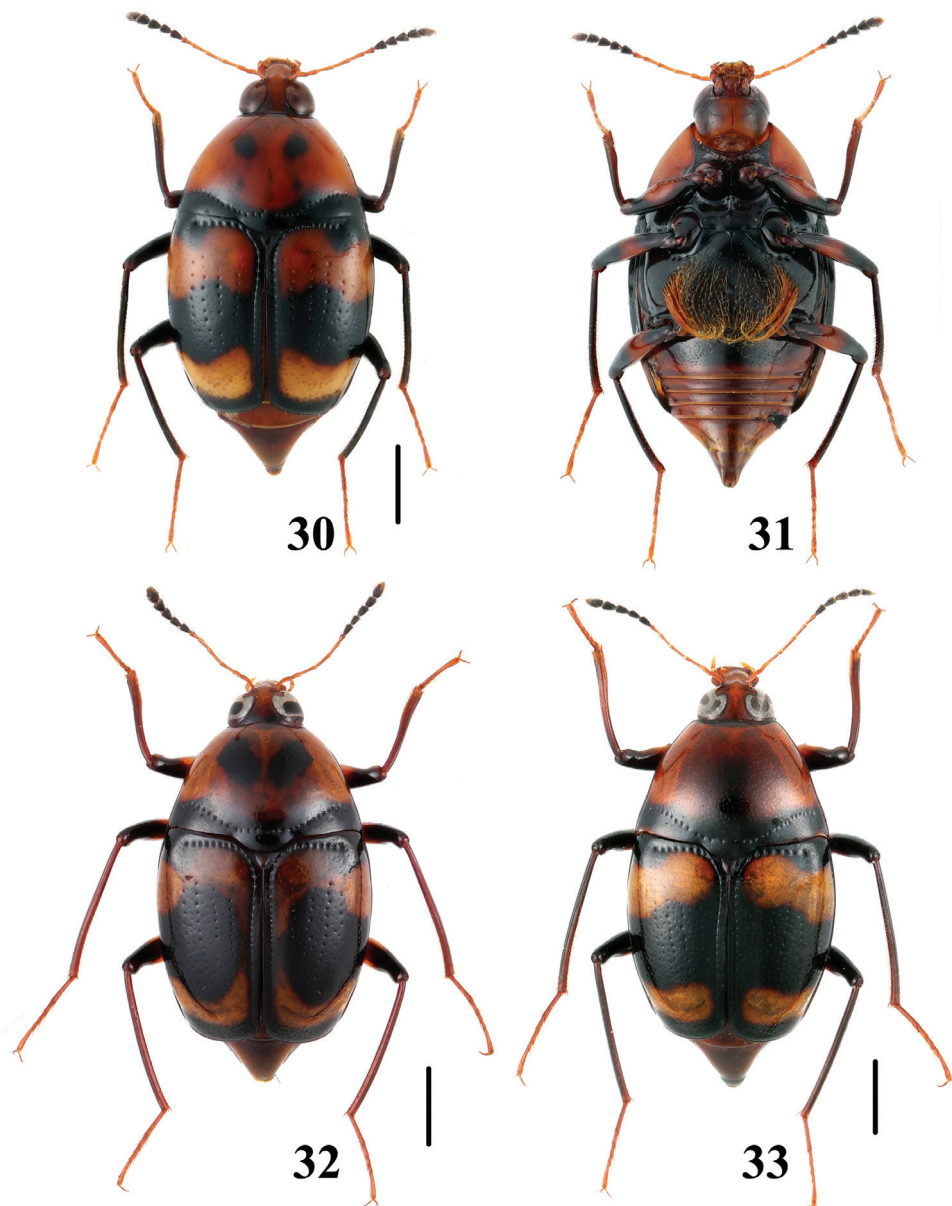
Figs 28–33, 98–101, 154

*Scaphidium sinense* Pic, 1954: 57; Löbl 1992: 583; Löbl 1999: 711; He et al. 2008b: 59.

**Material examined. Zhejiang:** 1♂, Lin'an City, Tianmushan, alt. 1100m, 2.V.2005, W.-X. Bi leg. (SHNU); 1♂, ibidem, alt. 1200m, 6.V.2007, W.-X. Bi leg. (SHNU); 1♂, ibidem, 15.VIII.2007, Y.-X. Wu leg. (SHNU); 4♂♂4♀♀, ibidem, alt. 1000m, 7–15.VIII.2010, L. Tang leg. (SHNU); 1♂, ibidem, alt. 250m, 15.VIII.2010, L. Tang leg. (SHNU); 1♂7♀♀, ibidem, alt. 1000–1200m, 18–21.VIII.2011, L. Tang leg. (SHNU); 1♂, ibidem, N30°19'10", E119°26'51", alt. 410m, 21.X.2013, Tang leg. (SHNU); 1♂, Lin'an City, Pingxi, N30°23', E119°28', alt. 1000–1100m, 9.VI.2012, J.-Q. Zhu leg. (SHNU); 1♂, Qingyuan County, Baishanzu, alt. 900–1400m, Hu, Tang & Zhu leg. (SHNU); 1♂, Kaihua County, Gutianshan, N29°15', E118°8', 21.VI.2013, X.-B. Song leg. (SHNU). **Jiangxi:** 1♂, Yushan County, Sanqingshan, Fenshui, alt. 400m, 12.X.2010, Peng, Zhai & Zhu leg. (SHNU); 1♀, Jiulianshan N. R., 27–28.VI.2012, Li leg. (SHNU); 1♀, Yichun City, Mingyueshan Park, N27°35'32", E114°17'13", alt. 1200–1600m, 12.VII.2013, Song, Yin & Yu leg. (SHNU); 3♂♂5♀♀, Luxi County, Yangjialing, N27°35'3", E114°15'2", alt. 820m, 15.VII.2013, Song, Yin & Yu leg. (SHNU); 1♀, Pingxiang City, Gaozhou County, Gaotianyan, N27°23'51", E114°0'54", alt. 1025m, 23.VII.2013, Song, Yin & Yu leg. (SHNU). **Hunan:** 3♀♀, Yanling County, Taoyuandong Park, N26°29'14", E114°0'42", alt. 770m, 16.VII.2013, Dai, Peng & Xie leg. (SHNU); 3♂♂3♀♀, Liuyang City, Daweishan, N28°25'28", E114°4'52", alt. 830m, 22.VII.2013, Dai, Peng & Xie leg. (SHNU); 2♂♂7♀♀, ibidem, N28°25'37", E114°7'43", alt. 1430m, 21.VII.2013, Dai, Peng & Xie leg. (SHNU). **Guangxi:** 20♂♂20♀♀, Shangsi County, Shiwandashan, alt 300–500m, Zhai, Peng, Zhu & Tang leg. (SHNU); 5♂♂17♀♀, Lingui County, Huaping N. R., Anjiangping, alt. 1200–1300m, 13–16.VII.2011, Ma, Chen, Zhu, Peng, Tang & He leg. (SHNU); 1♀, Jinxiu County, 16km away, alt. 900m, 31.VII.2011, Z. Peng leg. (SHNU).

**Distribution.** China (Zhejiang, Fujian, Jiangxi, Hunan, Guangxi).

**Remarks.** These are new records to Jiangxi, Hunan, Guangxi. The fascia pattern of pronotum is variable (Figs 29, 30, 32, 33) and the usually bicolored legs are



**Figures 30–33.** Habitus of *Scaphidium sinense*. **30, 31** (Zhejiang) **32** (Guangxi, Huaping) **33** (Guangxi, Shiwandashan). Scales = 1 mm.

entirely darkened in some individuals. The color pattern is related to geographical populations as suggested by following: approximately half of the specimens from Hunnan, Jiangxi and North Guangxi have the sub-basal and subapical fasciae of the elytra joined along the suture (Fig. 32); in specimens from Shiwandashan in

South Guangxi (Fig. 33), the pronotal fasciae tends to indistinct, the sub-basal and subapical fasciae of elytra are round on their inner corners; the body size of the Guangxi population is larger on average (4.4–5.9mm) than that of other populations (4.1–5.3mm). The species is similar to *S. harmandi* Achard, 1920 (see Achard 1920b) and differs in the bicolored legs which are entirely reddish in *S. harmandi*, and darkened terminal antennal segment which is entirely yellowish in *S. harmandi*.

***Scaphidium delatouchei* Achard, 1920**

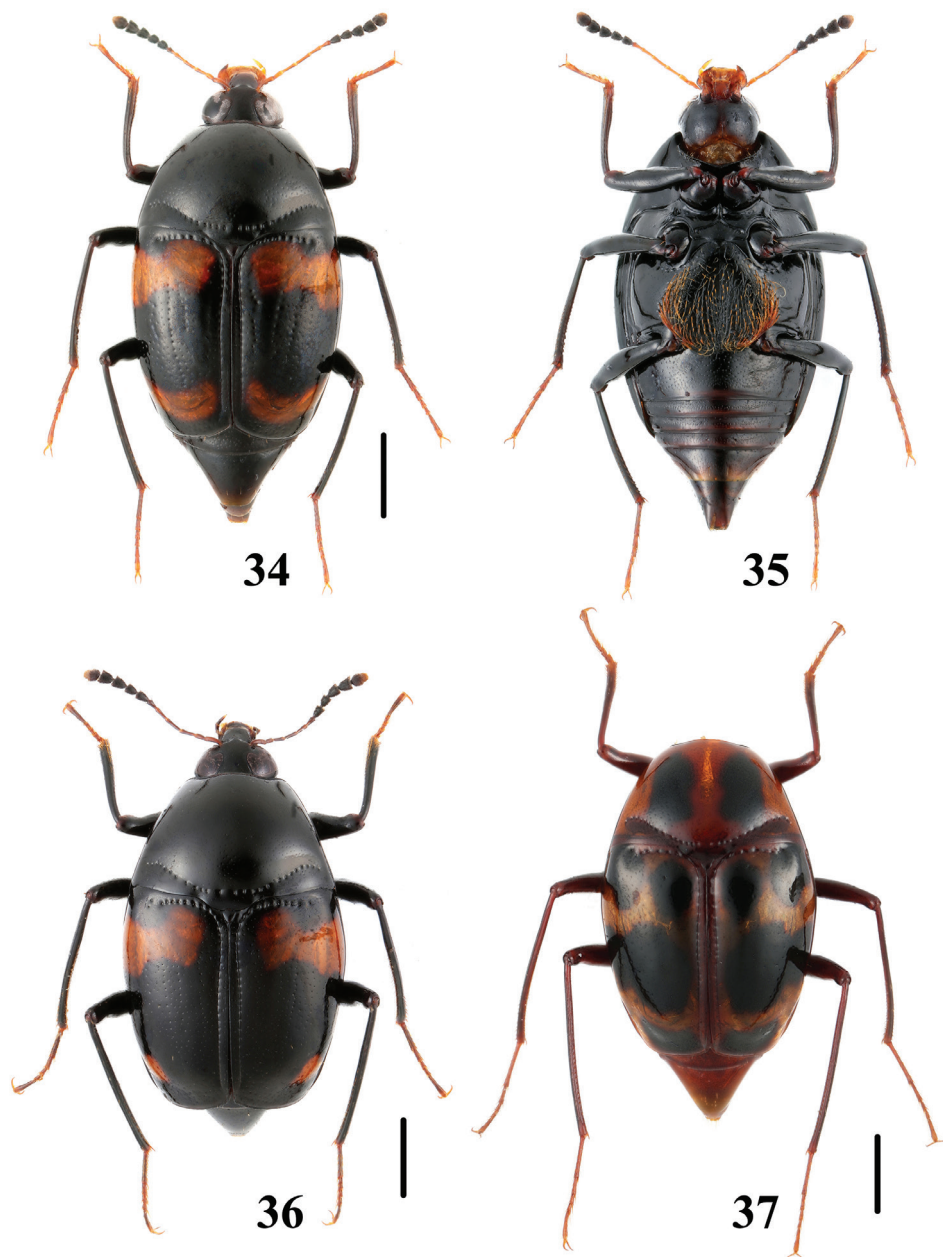
[http://species-id.net/wiki/Scaphidium\\_delatouchei](http://species-id.net/wiki/Scaphidium_delatouchei)

Figs 34–36, 102–105, 155

*Scaphidium delatouchei* Achard, 1920c: 210; Löbl 1999: 708.

**Material examined.** **Zhejiang:** 2♂♂, Lin'an City, West Tianmushan, alt. 250m, 15.VIII.2010, L. Tang leg. (SHNU); 1♂, ibidem, alt. 1000m, 7.VIII.2010, L. Tang leg. (SHNU); 1♀, ibidem, alt. 1000–1200m, 18.VIII.2011, L. Tang leg. (SHNU); 1♂, Anji County, Tonghanggang, N30°24', E119°26', alt. 1480m, 10.VI.2012, J.-Q. Zhu leg. (SHNU); 1♀, ibidem, N30°25', E119°26', alt. 1100m, 11.VI.2012, Hu & Yin leg. (SHNU); 1♂, Anji County, Longwangshan, Qianmutian, N30°24', E119°21', alt. 1050–1250m, 8.VI.2012, Hu & Yin leg. (SHNU); 1♂1♀, ibidem, N30°23'59", E119°26'26", alt. 1350m, 14.V.2013, X.-B. Song leg. (SHNU). **Hunan:** 1♂, Pingliang County, Mufushan, N28°58'18", E113°49'55", alt. 850m, 25.VII.2013, Dai, Peng & Xie leg. (SHNU); 1♂1♀, Taoyuandong Park, N26°29'14", E114°0'42", alt. 770m, 16.VII.2013, Dai, Peng & Xie leg. (SHNU); 2♀♀, Liuyang City, Daweishan, N28°25'37", E114°7'43", alt. 1430m, 21.VII.2013, Dai, Peng & Xie leg. (SHNU). **Hubei:** 1♀, Wufeng County, Houhe N. R., N37°5'9", E110°33'5", alt. 1160m, 8.VII.2013, Dai, Peng & Xie leg. (SHNU). **Anhui:** 1♂2♀♀, Yuexi County, Yaoluoping, alt. 1050–1430m, 17–21.VI.2013, Dai & Peng leg. (SHNU). **Sichuan:** 1♂, Qingchengshan, alt. 1100m, 8.VIII.2009, Tang & He leg. (SHNU); 1♀, Tianquan County, Lianglu, Shaochaigou, alt. 1530m, 11.IX.2011, W.-X. Bi leg. (SHNU); 1♂, Tianquan County, Laba River, N30°4', E102°25', alt. 1400m, 12.VII.2012, Peng, Dai & Yin leg. (SHNU). **Yunnan:** 2♀♀, Gongshan County, Bingzhongluo, Niwaluo, alt. 1862m, N28°3'287", E98°56'995", 15.VIII.2006, Y. Liu leg. (SHNU); 7♂♂6♀♀, Binchuan County, Jizushan, alt. 2400m, 18.VII.2010, L. Tang leg. (SHNU); 2♂♂2♀♀, Lijiang City, Hutiaoxia, alt. 1700m, 1.VIII.2010, X.-B. Song leg. (SHNU); 1♂, Baoshan City, Baihuailing, N25°16'46", E98°47'20", alt. 1350–1450m, 22.IV.2013, Peng & Dai leg. (SHNU). **Guangxi:** 1♀, Damingshan, N23°23', E108°29', alt. 1200–1300m, 30.VII.2012, Hu & Song leg. (SHNU).

**Distribution.** China (Zhejiang, Hunan, Hubei, Anhui, Sichuan, Yunnan, Guangxi, Guangdong).



**Figures 34–37.** Habitus of *Scaphidium*. **34–36** *S. delatouchei* **37** *S. biwenxuani* (Yunnan). Scales = 1 mm.

**Remarks.** These are new records to Zhejiang, Hunan, Hubei, Anhui, Sichuan and Guangxi. Most specimens from Jizushan and Hutiaoxia of Central Yunnan have the subapical fascia of elytra reduced to a spot (Fig. 36). The species is distinctive by its coloration and body size.



***Scaphidium biwenxuani* He, Tang & Li, 2008**

[http://species-id.net/wiki/Scaphidium\\_biwenxuani](http://species-id.net/wiki/Scaphidium_biwenxuani)

Figs 37–39, 106–109, 156–162

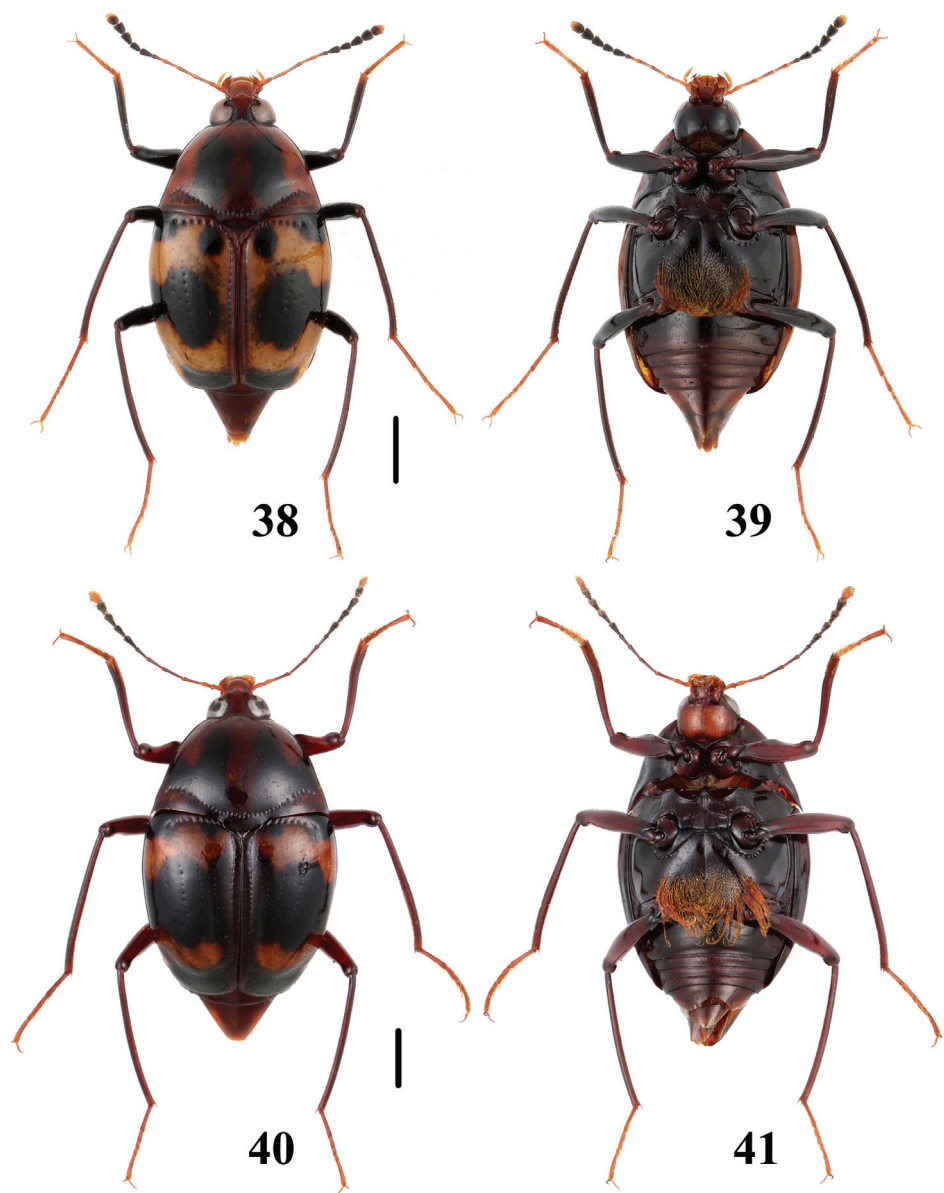
*Scaphidium biwenxuani* He, Tang & Li, 2008a: 178; Tang and Li 2013: 180.

**Material examined. Holotype.** Zhejiang: ♂, Anji County, Longwangshan, alt. 950–1200m, 25.IV.2006, Bi & Tang leg. (SHNU).

**Paratypes.** Zhejiang: 5♂♂2♀♀, same data as for the holotype (SHNU); 1♂1♀, Lin'an City, Tianmushan, alt. 1100m, 24.VIII.2006, Bi & Tang leg. (SHNU); 1♂1♀, ibidem, 18.IV.2007, Y.-X. Wu leg. (SHNU); 1♂, ibidem, 15.VIII.2007, H. Huang leg. (SHNU); 1♀, ibidem, 2-VIII-2006, X.-B. Song leg. (SHNU). Anhui: 4♀♀, Gu-niujiang, alt. 950–1050m, 28.IV.2005, Hu & Tang leg. (SHNU).

**Other material.** Zhejiang: 10♂♂13♀♀, Lin'an City, Tianmushan, alt. 1000m, 7.VIII.2010, L. Tang leg. (SHNU); 2♂♂, ibidem, alt. 1000m, 19. III.2009, M. Jin leg. (SHNU); 9♂♂8♀♀, ibidem, alt. 1000–1200m, 18–21.VIII.2011, L. Tang leg. (SHNU); 1♂5♀♀, ibidem, 12.V.2012, Li leg. (SHNU); 5♂♂8♀♀, Anji County, Longwangshan, alt. 1000–1500m, 8–10.VI.2012, Zhu, Hu & Yin leg. (SHNU); 26♂♂18♀♀, ibidem, alt. 1300–1500m, 14–19.V.2013; Tang, Dai & Peng leg. (SHNU); 1♂1♀, Qingyuan County, Baishanzu, alt. 1500m, 23.IX.2008, L. Tang leg. (SHNU). Sichuan: 1♂2♀♀, Tianquan County, Laba River, N30°4', E102°25', alt. 1400m, 12.VII.2012, Peng, Dai & Yin leg. (SHNU). Hunan: 1♂, Yanling County, Taoyuandong Park, N26°29'14", E114°0'42", alt. 770m, Dai, Peng & Xie leg. (SHNU). Hubei: 1♂4♀♀, Wufeng County, Houhe N. R., N30°5'7", E110°33'11", alt. 1200m, 9.VII.2013, Dai, Peng & Xie leg. (SHNU); 1♀, ibidem, 3.VIII.2013, H. Huang leg. (SHNU). Jiangxi: 1♂4♀♀, Yichun City, Mingyue-shan Park, N27°35'32", E114°17'13", alt. 1200–1600m, 12.VII.2013, Song, Yin & Yu leg. (SHNU); 1♀, ibidem, N27°35'44", E114°16'26", alt. 1140m, 23.X.2013, Song, Yin & Yan leg. (SHNU). Guizhou: 1♀, Leishan County, Leigongshan, Li-anhuaping, 13.VIII.2011, H. Xu leg. (SHNU); 1♀, Suiyang County, Kuanku-oshui N. R., Gongtonggou, alt. 1550m, 9.VI.2010, Yin, Zhai & Liu leg. (SHNU). Guangxi: 3♂♂, Jinxiu County, Shengtangshan, alt. 1900m, 25.VII.2011, Z. Peng leg. (SHNU); 2♀♀, Jinxiu County, Yinshan Baohuzhan, alt. 1200m, 23.VII.2011, Zhu, Hu & Song leg. (SHNU); 1♀, Shangsi County, Shiwandashan, alt. 300–700m, 23.IV.2011, Zhai, Peng & Zhu leg. (SHNU); 1♂, Lingui County, Huaping N. R., Anjiangping, alt. 1200m, 13.VII.2011, Tang & He leg. (SHNU); 1♀, Damingshan, 23°23'N, 108°29'E, alt. 1200–1300m, 30.VII.2012, Hu & Song leg. (SHNU). Yunnan: Daweishan N. R., Yuping, alt. 2000m, 20.V.2009, W.-X. Bi leg. (SHNU).

**Distribution.** China (Zhejiang, Anhui, Hunan, Hubei, Jiangxi, Guizhou, Sichuan, Yunnan, Guangxi).



**Figures 38–41.** Habitus of *Scaphidium*. **38, 39** *S. biwenxuani* (Zhejiang) **40, 41** *S. robustum*. Scales = 1 mm.

**Remarks.** These are new records to Hunan, Hubei, Jiangxi, Sichuan and Yunnan. The pattern of the fasciae in this species is rather invariable though it is distinctly bold in the specimen from Yunnan (Fig. 37). The species is similar to *S. robustum* sp. n., for differences see remarks below.

***Scaphidium robustum* sp. n.**

<http://zoobank.org/D8B83013-0ED1-47A6-8B66-FBD104B785D7>

[http://species-id.net/wiki/Scaphidium\\_robustum](http://species-id.net/wiki/Scaphidium_robustum)

Figs 40, 41, 110–113

**Type material. Holotype. Fujian:** ♂, Wuyishan City, Guadun Vil., N27°44', E117°37', alt. 1200–1500m, 28.V.2012, Peng & Dai leg. “Holotype / *Scaphidium robustum* / Tang & Li” [red handwritten label] (SHNU).

**Paratypes. Fujian:** 1♀, same data as for the holotype (SHNU); 1♂3♀♀, ibidem, N27°44', E117°38', alt. 1100–1500m, 27.V.2012, Dai, Peng & Song leg. (1 pair in MHNG, remaining in SHNU). **Chongqing:** 2♂♂, Nanchuan, Jinfoshan, N29°2', E107°11', alt. 1000–1300m, 8.IV.2012, H. Huang leg. (SHNU). **Guizhou:** 1♂, Leishan County, Leigongshan, Lianhuaping, 15.IX.2005, Y. Liu leg. (SHNU). **Guangxi:** 1♂, Lingui County, Huaping N. R., Anjiangping, alt. 1400–1700m, 14.VII.2011, Z. Peng leg. (SHNU); 1♀, Jinxiu County, 16km away, alt. 900m, 31.VII.2011, Z. Peng leg. (SHNU); 1♀, Jinxiu County, Shengtangshan, alt. 1200–1400m, 25.VII.2011, Hu & Yin leg. (SHNU); 1♀, Nanning City, Damingshan, alt. 1200m, 21–23.IV.2012, Li leg. (SHNU). **Yunnan:** 1♂, Lushui County, Pianma, 9–11.V.2004, Yang & Liu leg. (HBUM).

**Description.** BL: 5.7–6.4 mm.

Body mostly reddish-brown with ventral side, except head and sternites, slightly darker. Antennal club (Fig. 112) blackish with terminal segment entirely yellowish. Pronotum with two longitudinal black fasciae, each fascia usually extends laterally basally along the antebasal puncture row, sometimes reduced to longitudinal fascia at middle and separated small lateral spot. Elytra blackish, each with two orange fasciae. Subhumeral fascia tridentate anteriorly and bidentate posteriorly. Subapical fascia curved towards base with apicolateral part extending to apicolateral corner of elytron.

Frons finely, sparsely and very shallowly punctate, punctures of vertex coarser than those of remaining portion.

Pronotum slightly raised above elytra. Antebasal puncture row impressed, continuous in middle, with punctures coarse and regular; discal punctation similar to that of vertex, puncture intervals as broad as 1.5 to 4 puncture diameter.

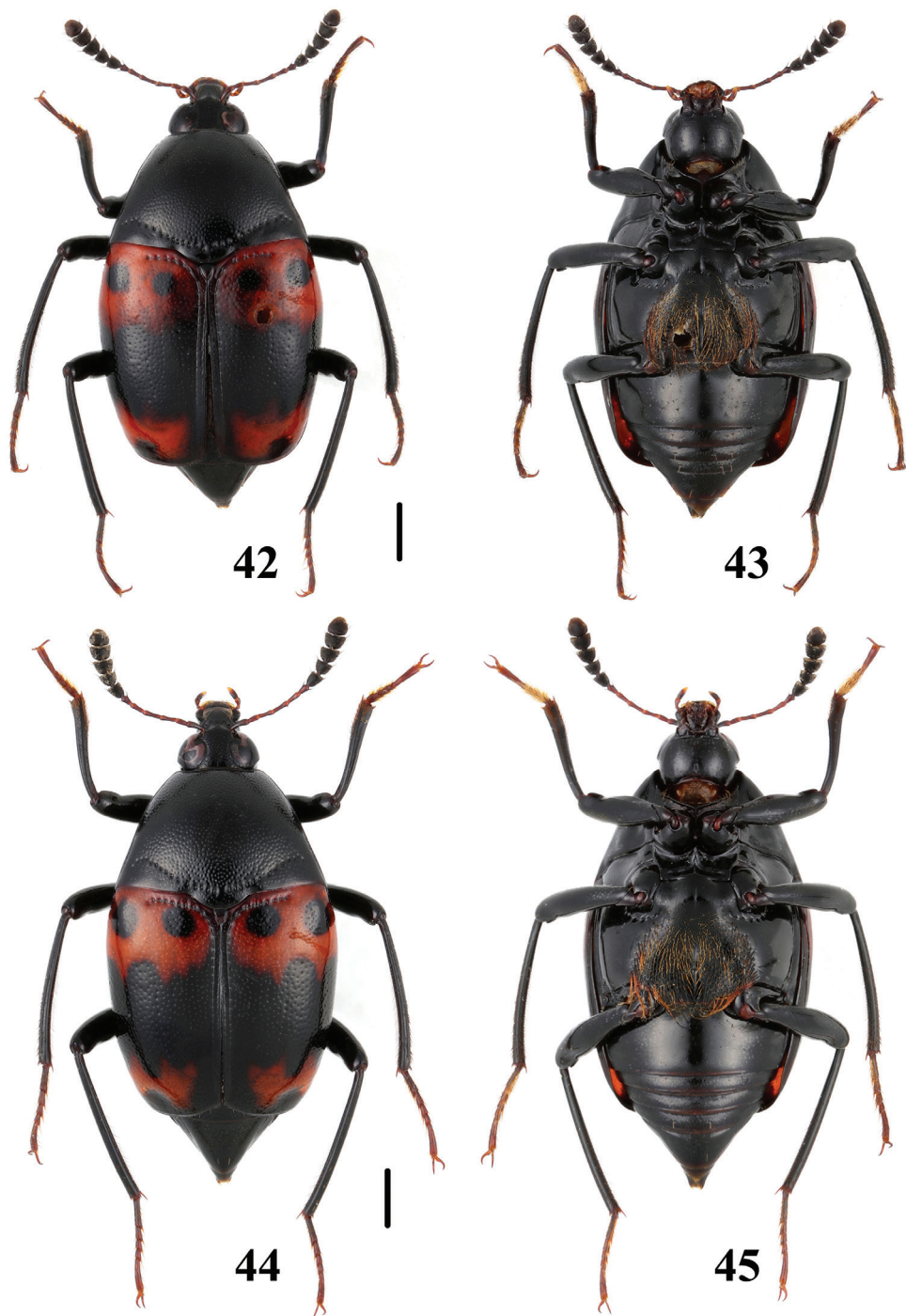
Elytra with disc almost even apically, basal and sutural stria rows impressed; discal punctation similar to that of pronotum except on coarser and more densely punctuated apical portion; each elytron with one indistinct discal puncture rows consisting of slightly coarser punctures; basal stria row with punctures similar to those forming pronotal antebasal row, sutural stria puncture row relatively fine.

Prohypomera slightly uneven and smooth.

Mesepisterna finely, sparsely and very shallowly punctate.

Abdominal tergites with relatively fine and sparse punctures and very dense micropunctures. Sternite III with distinct micropunctures especially on median portions, remaining sternites with dense microsculpture consisting of micropunctures.

Legs relatively long, mesotibiae and metatibiae moderately curved.



**Figures 42–45.** Habitus of *Scaphidium*. **42, 43** *S. bayibini* **44, 45** *S. klapperichi*. Scales = 1 mm.

Male. Metaventrite (Fig. 41) impressed at middle, with long and suberect pubescence. Protibiae (Fig. 113) slightly sinuate. Median lobe of aedeagus (Fig. 110) with longitudinal bands well developed, sclerotized internal sac (Fig. 111) consisting of one x-shaped apical sclerite and a complex of basal sclerites.

**Distribution.** China (Fujian, Chongqing, Guizhou, Guangxi, Yunnan).

**Remarks.** The new species is similar to *S. biwenxuani*, but can be distinguished from the latter by its larger and broader body, the smaller inner black dot near scutellum, the slender antennal club and the terminal antennal segment entirely yellowish, while in *S. biwenxuani* it is yellowish in apical third.

**Etymology.** The Latin adjective “robustum” refers to the robust body form.

***Scaphidium bayibini* sp. n.**

<http://zoobank.org/5C421CE6-1019-4E21-9BF1-1681FCE7FA5C>

[http://species-id.net/wiki/Scaphidium\\_bayibini](http://species-id.net/wiki/Scaphidium_bayibini)

Figs 42, 43, 114–117

**Type material. Holotype. Anhui:** ♂, Yuexi County, Yaoluoping N. R., Ximianzi Vil., N30°58'55", E116°3'49", alt. 1050m, 21.VI.2013, Dai & Peng leg. “Holotype / *Scaphidium bayibini* / Tang & Li” [red handwritten label] (SHNU).

**Paratypes. Anhui:** 1♀, same data as for the holotype (SHNU); 1♂, Yuexi County, Yaoluoping, Xiaoqiling, 18–19.VII.2007, Ba, Lang & Wang leg. (HBUM); 1♀, Yuexi County, Yaoluoping Vil., 30.VII–4.VIII.2007, Ba, Lang & Wang leg. (HBUM).

**Description.** BL: 6.8–7.5 mm.

Body black with antennal segments I–VI and tarsi brownish. Antennal club (Fig. 116) blackish with terminal segment slightly lighter in apical 1/3. Elytra each with two reddish fasciae. Basal fascia large, touching basal and lateral margins and suture of elytron, bidentate posteriorly. Two black dots entirely sealed in basal fascia with inner black dot smaller and separated from basal stria. Subapical fascia tridentate anteriorly and bidentate posteriorly.

Frons coarsely and densely punctate, punctures on vertex denser than those on remaining surface.

Pronotum slightly raised above elytra. Antebasal puncture row impressed, more or less interrupted at middle, with punctures coarse and somewhat elongate; discal punctation coarser than that on vertex, puncture intervals mostly as broad as half puncture diameters.

Elytra with disc slightly impressed apically, basal and sutural stria rows impressed; discal punctation slightly sparser than that of pronotum except that on basal fascia which is distinctly finer and sparser; basal stria row with punctures similar to those forming pronotal antebasal row, sutural stria puncture row relatively fine.

Prohypomera slightly uneven, with relatively fine and very shallow punctures, especially on outer half.

Mesepisterna finely, sparsely and shallowly punctate.



Abdominal tergites with relatively coarse and dense punctures and distinct microsculpture consisting of micropunctures. Sternites with fine and shallow punctures and relatively faint microsculpture consisting of micropunctures.

Legs moderately long, mesotibiae and metatibiae moderately curved.

Male. Metaventricle (Fig. 43) impressed at middle, with long and suberect pubescence. Profemur (Fig. 117) with ventral side moderately expanded, forming two ridges. Protibia (Fig. 117) gradually widened starting from basal 1/3, forming blunt protuberance at widest point, narrowed toward apex. Median lobe of aedeagus (Fig. 114) with distinct longitudinal bands, sclerotized internal sac (Fig. 115) consisting of two apical longitudinal sclerotized rods and two basal transverse sclerotized rods.

**Distribution.** China (Anhui).

**Remarks.** The new species is extremely similar to *S. klapperichi* and can be distinguished by the broader antennal club, the elytra with the inner black dot of basal fascia separated from basal stria, and the distinctive shape of the aedeagal sclerites.

**Etymology.** This species is named in honor of Mr. Yi-Bin Ba, who firstly collected specimens of the new species.

### ***Scaphidium klapperichi* Pic, 1954**

[http://species-id.net/wiki/Scaphidium\\_klapperichi](http://species-id.net/wiki/Scaphidium_klapperichi)

Figs 44, 45, 118–121, 164, 165

*Scaphidium klapperichi* Pic, 1954: 57; Löbl 1999: 710.

**Material examined.** **Zhejiang:** 3♂♂, Qingyuan County, Baishanzu, alt. 1500m, 23.IX.2008, L. Tang leg. (SHNU); 1♀, Lin'an City, West Tianmushan, alt. 300m, 26.IV.2008, Z.-W. Yin leg. (SHNU); 1♀, Anji County, Longwangshan, alt. 1000m, 25.V.2012, J.-Q. Zhu leg. (SHNU). **Fujian:** 6♂♂9♀♀, Wuyishan City, Guadun, alt. 1100–1500m, 25–29.V.2012, Peng & Dai leg. (SHNU).

**Distribution.** China (Zhejiang, Fujian).

**Remarks.** This is new record to Zhejiang. The species is extremely similar to *S. bayibini* and can be distinguished by the slender antennal club, the elytra each with the inner black dot of basal fascia touching basal stria and the different shape of the aedeagal sclerites.

### ***Scaphidium stigmatinotum* Löbl, 1999**

[http://species-id.net/wiki/Scaphidium\\_stigmatinotum](http://species-id.net/wiki/Scaphidium_stigmatinotum)

Figs 46, 47, 122–125

*Scaphidium stigmatinotum* Löbl, 1999: 719; He et al. 2008b: 60; Tang and Li 2013: 179.

**Material examined. Shaanxi:** 2♂♂6♀♀, Zhouzhi County, Qinling, Houzhenzi, N33°50'613", E107°50'183", alt. 1336m, 17–19.VII.2009, Huang & Xu leg. (SHNU); 2♂♂, Zhashui County, Yingpan Town, Hongmiaohe Vil., N33°82'189", E108°98'289", alt. 1110m, 3.VI.2007, H.-L. Shi leg. (IOZ). **Hunan:** 1♂, Mangshan, 25.IV.1977, J.-Y. Wu leg. (SEM) **Anhui:** 5♂♂8♀♀, Yuexi County, Yaoluoping, alt. 1050–1650m, 16–19.VI.2013, Dai & Peng leg. (SHNU) **Jiangsu:** 1♀, Nanjing City, Zijinshan, 10.VII.2005, Y. Huang leg. (SHNU); 1♀, Nanjing City, Zijinshan, 14.V.2006, L. Tang leg. (SHNU) **Zhejiang:** 1♀, Lin'an City, Tianmushan, alt. 300m, 10.VI.2007, Y.-X. Wu leg. (SHNU); 1♀, ibidem, N30°19'10", E119°26'51", alt. 410m, 21.X.2013, X.-B. Song leg. (SHNU); 1♀, Xianju County, Danzhu, alt. 450–600m, 2.VI.2006, Li & Shen leg. (SHNU); 1♀, Zhuji City, Caotazheng, Qiandashan, N29°39'04", E120°08'19", alt. 140m, under moss, 17.III.2012, T. X. Zhao leg. (CZTX); 1♂2♀♀, ibidem, from fungi, 30.IV.2012, T. X. Zhao leg. (CZTX); 1♂, ibidem, from fungi, 13.V.2012, T. X. Zhao leg. (CZTX); 1♀, Kaihua County, Gutianshan, N29°15', E118°8', 21.VI.2013, X.-B. Song leg. (SHNU) **Fujian:** 1♂, Jianning, Jinraoshan, 11.VI.1959, Jin & Lin leg. (SEM); 1♂1♀, Wuyishan City, Guadun, N24°44'2", E117°38'15", alt. 1200–1300m, 28.V.2012, X.-B. Song, leg. (SHNU) **Guangdong:** 1♀, Ruyuan County, Nanling N. R., alt. 1050m, 15.VII.2012, Ning & Yu leg. (SHNU); 1♀, ibidem, 1.VII.2009, L. Tang leg. (SHNU); 1♂, ibidem, 23.VIII.2009, L. Tang leg. (SHNU); 1♂, Shixing County, Chebaling, Xianrendong Vil., N24°73'478, E114°20'727", alt. 1508m, 26.VII.2008, H.-B. Liang leg. (IOZ); 1♂, Lian County, Nanling, Dadongshan, 3.VI.1998, Ouyang leg. (SYSU); 1♂, ibidem, 1.VIII.2007, H.-D. Chen leg. (SYSU); 1♂, ibidem, 26.VI.2009, R.-X. Jiang leg. (SYSU) **Guangxi:** 2♂♂1♀, Lingui County, Huaping N. R., Anjingping, alt. 1320m, 12.VII.2011, Peng & Zhu leg. (SHNU); 1♂1♀, Damingshan, N23°23', E108°29', alt. 1200–1300m, 30.VII.2012, J.-Y. Hu & X.-B. Song leg. (SHNU).

**Distribution.** China (Shaanxi, Hunan, Anhui, Jiangsu, Zhejiang, Fujian, Guangdong, Guangxi, Yunnan).

**Remarks.** This is new record to Anhui. The type locality: Yizu shan in original description is a typo error, which should be Jizushan of Central Yunnan. The species is characterized by the extremely dense punctation on the dorsum of the body and by one black dot entirely sealed in the basal fascia of the elytra.

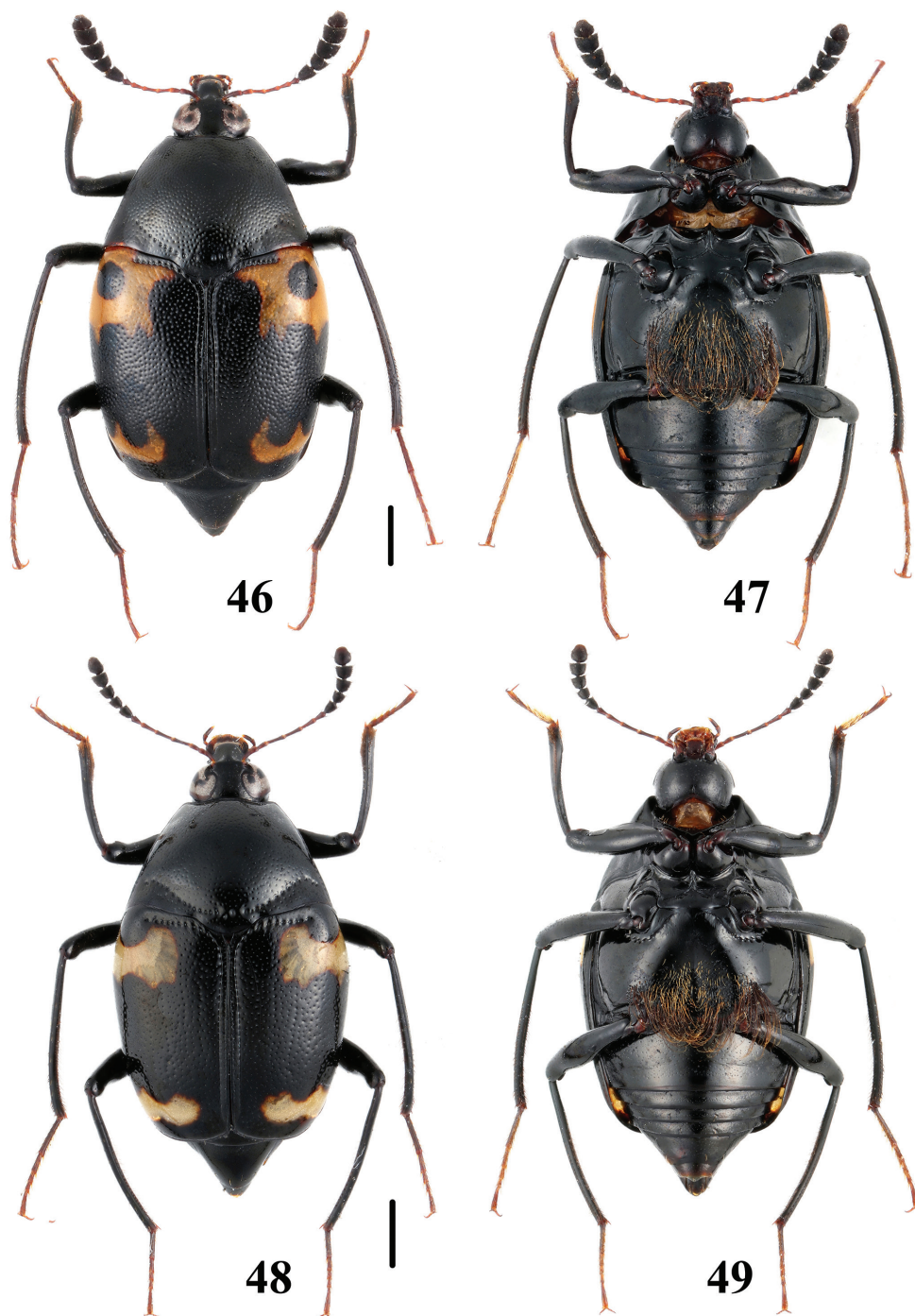
### *Scaphidium wuyongxiangi* He, Tang & Li, 2008

[http://species-id.net/wiki/Scaphidium\\_wuyongxiangi](http://species-id.net/wiki/Scaphidium_wuyongxiangi)

Figs 48, 49, 126–129, 166

*Scaphidium wuyongxiangi* He, Tang & Li, 2008b: 57; Tang and Li 2013: 178.

**Material examined. Holotype. Zhejiang:** ♂, Lin'an City, Tianmushan, 15–28.VIII.2003, Tang & Hu leg. (SHNU) **Paratypes. Zhejiang:** 1♂, Anji County, Longwangshan, 27.IV.2006, Tang & He leg. (SHNU); 1♀, Lin'an City, Tianmushan, alt. 300–400m,



**Figures 46–49.** Habitus of *Scaphidium*. **46, 47** *S. stigmatinotum* **48, 49** *S. wuyongxiangi*. Scales = 1 mm.

11–15.VI.2007, HU Jia-Yao & WANG Yong-Yin leg. (SHNU); 1♀, ibidem, alt. 1000m, 19.V.2006, L. Ding leg. (SHNU); 2♂♂, Changhua Town, Qingliangfeng N. R., alt. 900m, 13.V.2008, BI Wen-Xuan leg. (SHNU) **Anhui**: 1♂7♀♀, Guniujiang, alt. 950–1050m, 28.IV.2005, Tang & Hu leg. (SHNU).

**Other material.** **Anhui**: 1♂1♀, Yuexi County, Yaoluoping, alt. 1050–1650m, 17–19.VI.2013, Dai & Peng leg. (SHNU) **Zhejiang**: 1♂, Lin'an City, West Tianmushan, 5.VI.2008, X.-B. Song leg. (SHNU); 3♂♂1♀, ibidem, alt. 1000m, 7.VIII.2010, L. Tang leg. (SHNU); 1♀, ibidem, 12.V.2012, Li leg. (SHNU); 1♂, ibidem, N30°23', E119°25', alt. 1450m, 8.IX.2012 (SHNU); 2♂♂2♀♀, Lin'an City, East Tianmushan, alt. 1050–1150m, 13.IV.2011, Peng & Zhu leg. (SHNU); 1♂1♀, Anji County, Tonghanggang, N30°24', E119°26', alt. 1480m, 10.VI.2012, J.-Q. Zhu leg. (SHNU); 2♂♂1♀, Anji County, Longwangshan, Qianmutian, N30°24', E119°25', alt. 1050–1250m, 7.VI.2012, Hu, Yin & Ning leg. (SHNU); 3♂♂4♀♀, ibidem, N30°23'59", E119°26'26", alt. 1350m, 14.V.2013, Song & Tang leg. (SHNU); 1♀, Qingliangfeng, Longtangshan, Jiupu Vil., alt. 600–1000m, 19.VII.2009, Z.-W. Yin leg. (SHNU); 1♀, Longquan City, Fengyangshan, alt. 1500m, 10.VIII.2008, W.-X. Bi leg. (SHNU) **Fujian**: 3♂♂1♀, Wuyishan City, Guadun, N 27°45', E117°28', alt. 1800 m, 1.VI.2012, Peng & Dai leg. (SHNU) **Jiangxi**: 2♀♀, Yichun City, Mingyueshan, N27°35'44", E114°16'26", alt. 1140m, 23.X.2013, Peng, Shen & Yan leg. (SHNU); 4♂♂, Luxi County, Yangshimu, N27°33'58", E114°14'24", alt. 1230m, 25.X.2013, Peng, Sheng & Yan leg. (SHNU); 15♂♂9♀♀, Luxi County, Wugongshan, N27°27'55", E114°10'10", alt. 1280m, 28.X.2013, Peng, Shen & Yan leg. (SHNU) **Sichuan**: 1♂1♀, Mingshan County, Mendingshan, alt. 1400m, 6.VIII.2009, Tang & He leg. (SHNU).

**Distribution.** China (Zhejiang, Anhui, Jiangxi, Fujian, Sichuan).

**Remarks.** This is new record to Jiangxi. The species is characterized by its dumb-bell-shaped fascia of elytra.

### *Scaphidium vernicatum* (Pic, 1954)

[http://species-id.net/wiki/Scaphidium\\_vernicatum](http://species-id.net/wiki/Scaphidium_vernicatum)

Figs 50, 51, 130–133

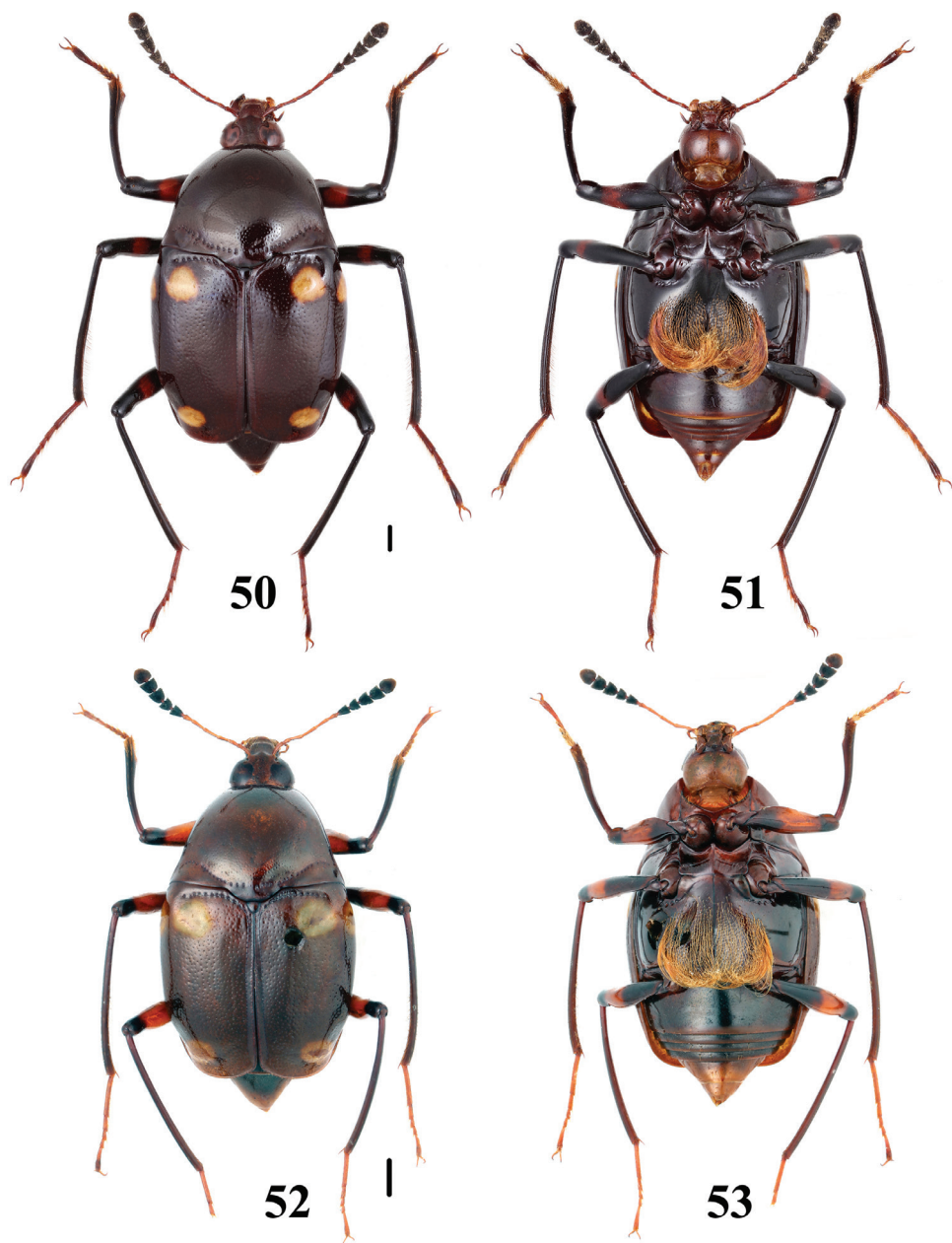
*Scaphium vernicatum* Pic, 1954c: 57; Löbl 1999: 711.

**Material examined. Paralectotype.** **Fujian**: 1♀, Kuatun, 4.V.1946. (MHNG).

**Other material.** **Fujian**: 3♂♂2♀♀, Wuyishan City, Guadun, alt. 1100–1500m, 29.V.–1.VI. 2012, Song, Peng & Dai leg. (SHNU)

**Distribution.** China (Fujian, Jiangxi).

**Remarks.** The species is the largest species in China, with the BL 8.7–14.3mm. It is extremely similar to *S. perpulchrum* Csiki, 1909 from Vietnam and no striking difference is known between them, though an immature male specimen of *S. perpulchrum* identified by Löbl has larger elytral fascia and faint coloration of body. The



**Figures 50–53.** Habitus of *Scaphidium*. **50, 51** *S. vernicatum* **52, 53** *S. perpulchrum*. Scales = 1 mm.

species is also similar to *S. direptum* Tang & Li, 2010 and *S. connexum* sp. n., but differs from them by the larger body size and bicolored legs, and from *S. connexum* also by the subhumeral fascia consisting of two separated yellow dots which are connected in *S. connexum*.



***Scaphidium direptum* Tang & Li, 2010**

[http://species-id.net/wiki/Scaphidium\\_direptum](http://species-id.net/wiki/Scaphidium_direptum)

Figs 54, 55, 134–137

*Scaphidium direptum* Tang & Li, 2010b: 318.

**Material examined. Holotype. Guangdong:** ♂, Shixing County, Chebaling N. R., alt. 365–500m, 23–26. VII.2008, X.-Y. Zhu leg. (SHNU).

**Paratypes. Guangdong:** 1♂1♀, same data as for the holotype. (SHNU) **Fujian:** 1♀, Wuping County, Liangyeshan N. R., alt. 510m, 19.XI.2006, W.-J. He leg. (SHNU).

**Other material. Guangdong:** 1♂, Leqing County, Bijiashan, alt. 120–200m, 16–18.X.2003, K.-B. Deng leg. (SYSU) **Guangxi:** 1♀, Shangsi County, Shiwandashan, alt. 300–500m, 25.IV.2011, Zhai, Peng & Zhu leg. (SHNU)

**Distribution.** China (Guangdong, Fujian, Guangxi).

**Remarks.** This is a new record for Guangxi. The species is similar to *S. vernicatum* *S. perpulchrum* and *S. connexum*; for differences see remarks under *S. vernicatum*.

***Scaphidium connexum* sp. n.**

<http://zoobank.org/C0043E72-CCA0-4FED-AF4F-71BED5D27885>

[http://species-id.net/wiki/Scaphidium\\_connexum](http://species-id.net/wiki/Scaphidium_connexum)

Figs 56, 57, 138–141

*Scaphidium vernicatum*: Tang & Li, 2010b: 320 (misidentification).

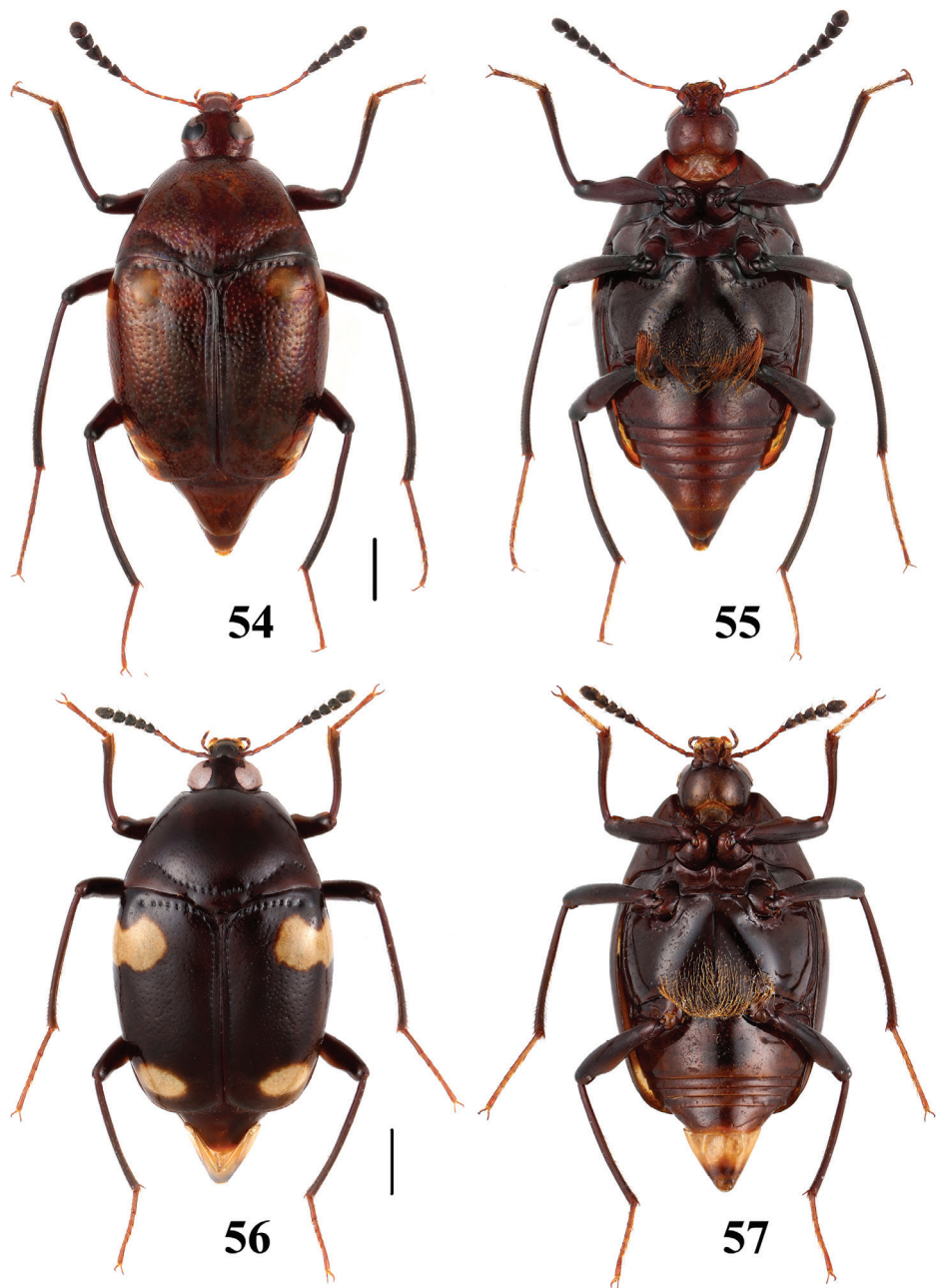
**Type material. Holotype. Zhejiang:** ♂, Kaihua County, Gutianshan, N29°15', E118°8', alt. 800m, 21.VI.2013, X.-B. Song leg. (SHNU).

**Paratypes. Zhejiang:** 3♂♂1♀, same data as for the holotype (1 pair in MHNG, remaining in SHNU); 1♂, ibidem, N29°14', E118°8', alt. 400–500m, 19.VI.2013, X.-B. Song leg. (SHNU). **Fujian:** 1♀, Fuzhou City, Beifeng, 4.III.2004, M. Li leg. (SHNU); 1♂, Wuyishan, Guadun, alt. 1200m, 9.VI.2009, Y. Huang leg. (SHNU); 3♀♀, ibidem, N27°44', E117°38", alt. 1300–1500m, 27–29.V.2012, Peng & Dai leg. (SHNU). **Guangxi:** 1♂, Shangsi County, Shiwandashan, alt. 300–500m, 23.IV.2011, Zhai, Peng & Zhu leg. (SHNU); 1♂, Xing'an County, Maoershan, N25°48', E110°24', alt. 450m, 25.VII.2012, J.-Y. Hu leg. (SHNU).

**Description.** BL: 5.4–7.1 mm.

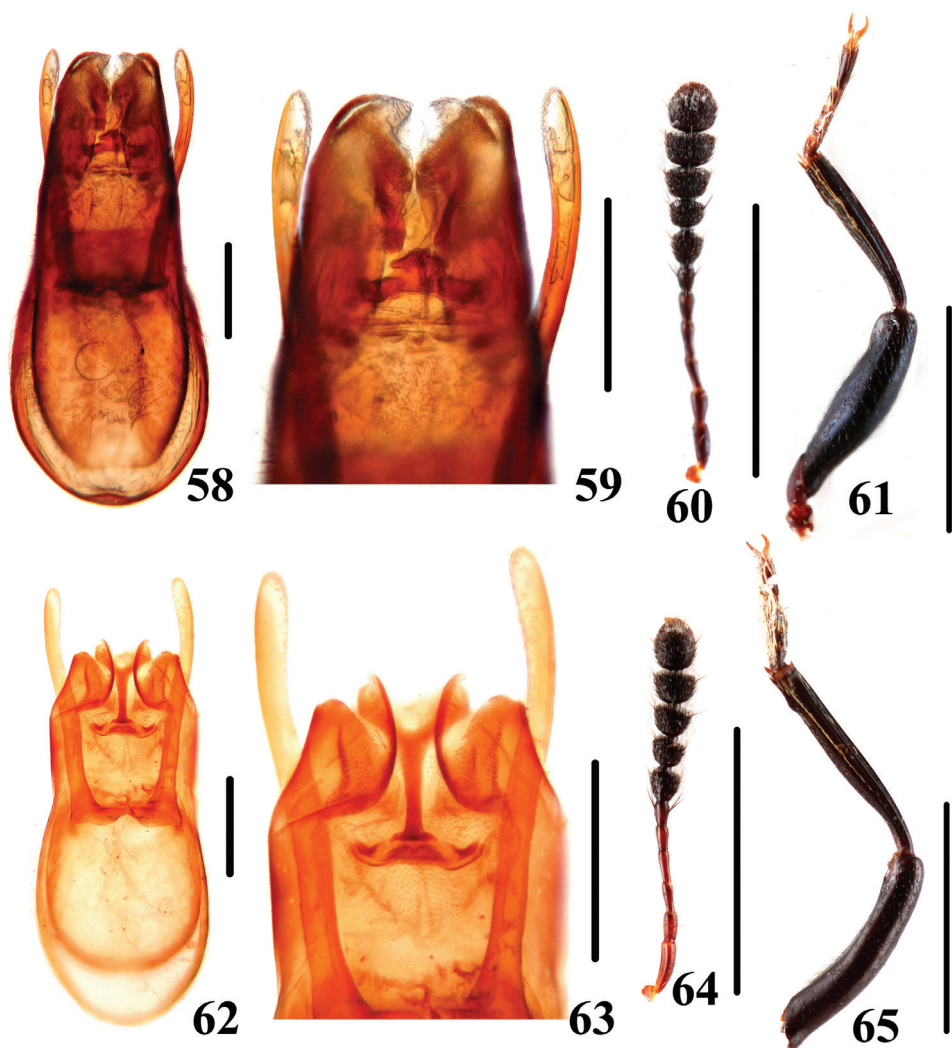
Body dark brown with antennal segments I–VI and tarsi lighter. Antennal club (Fig. 140) blackish with terminal segment slightly lighter in apical 1/3. Each elytron with two yellowish fasciae: dumbbell-shaped subhumeral fascia and round subapical fascia.

Frons coarsely and densely punctate, punctures on vertex coarser and denser than those on remaining surface, puncture intervals of vertex mostly smaller than half puncture diameter.



**Figures 54–57.** Habitus of *Scaphidium*. **54, 55** *S. direptum* **56, 57** *S. connexum*. Scales = 1 mm.

Pronotum slightly raised above elytra. Antebasal puncture row impressed, more or less interrupted at middle, with punctures coarse and regular; discal punctation coarser than that of vertex, puncture intervals as broad as 0.5 to 1.5 puncture diameters.



**Figures 58–65.** Characters of *Scaphidium*. **58–61** *S. jinmingi* **62–65** *S. comes* **58, 59, 62, 63** aedeagus **60, 64** antenna **61, 65** male foreleg. Scales = 0.25 mm (**58, 59, 62, 63**); scales = 1 mm (**60, 61, 64, 65**).

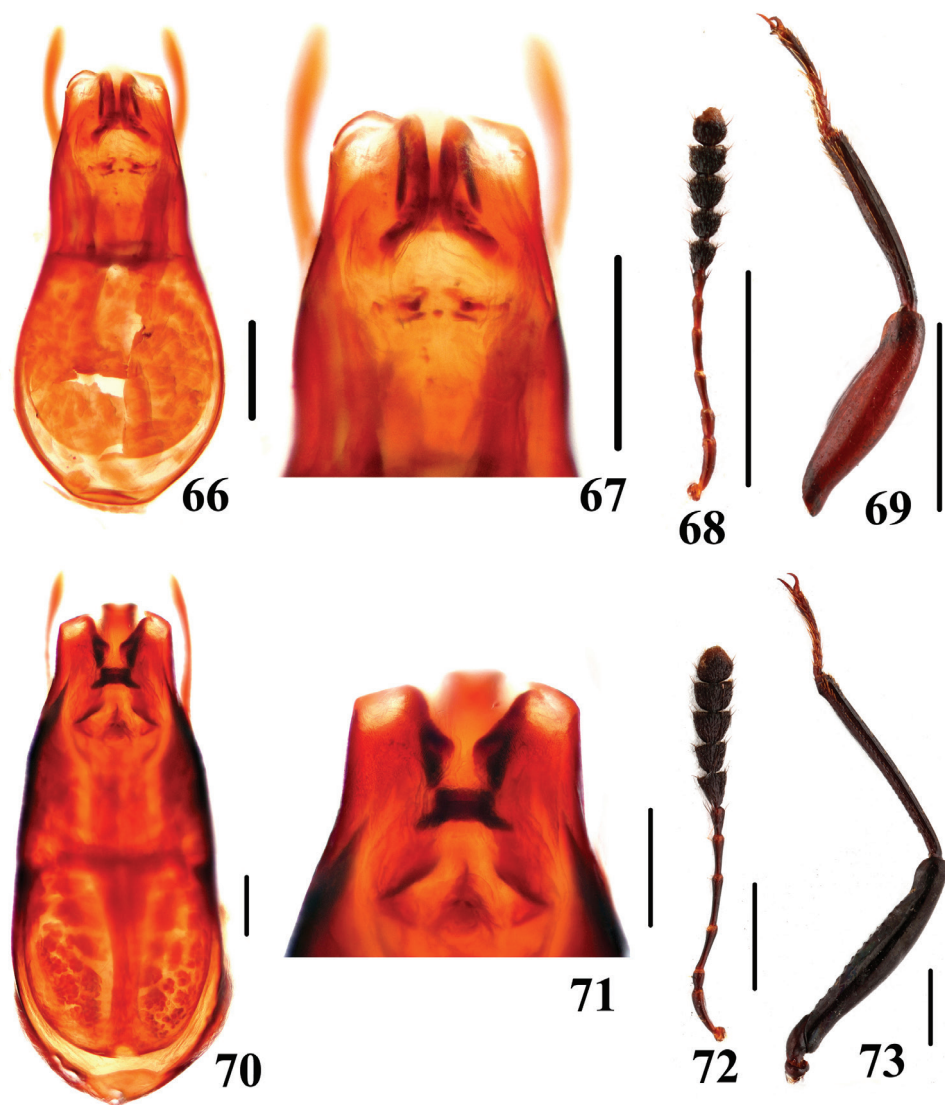
Elytra with disc slightly impressed apically, basal and sutural stria rows impressed, without discal puncture row; discal punctation similar to that of pronotum except on slightly denser punctuated apical impression; basal stria row with punctures slightly coarser than those forming pronotal antebasal row, sutural stria puncture row very fine.

Prohypomera moderately uneven, with relatively coarse, sparse and shallow punctures.

Mesepisterna sparsely and distinctly punctate.

Abdominal tergites and sternites with relatively coarse and dense punctures: and dense microsculpture consisting of micropunctures.

Legs moderately long, mesotibiae and metatibiae moderately curved.

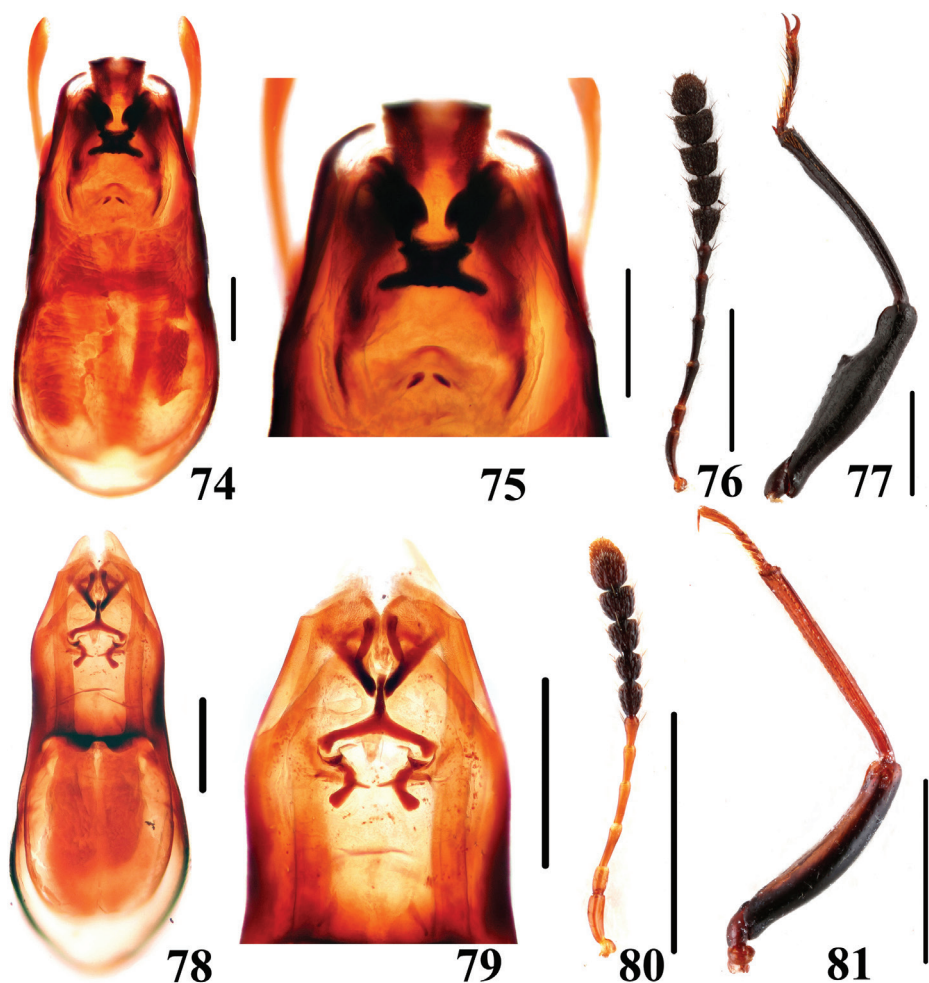


**Figures 66–73.** Characters of *Scaphidium*. **66–69** *S. fukiense* **70–73** *S. grande* **66, 67, 70, 71** aedeagus **68, 72** antenna **69, 73** male foreleg. Scales = 0.25 mm (66, 67, 70, 71); scales = 1 mm (68, 69, 72, 73).

Male. Metaventricle (Fig. 57) impressed at middle, with long and suberect pubescence. Profemur (Fig. 141) with ventral side roundly expanded in basal 1/5 to basal 3/5, forming two ridges. Protibia (Fig. 141) gradually wider starting from basal 1/3, without distinct protuberance at widest point, slightly narrowed toward apex. Median lobe of aedeagus (Fig. 138) with sclerotized internal sac (Fig. 139) consisting of apical and basal complex of sclerites.

**Distribution.** China (Zhejiang, Fujian, Guangxi).





**Figures 74–81.** Characters of *Scaphidium*. **74–77** *S. spinatum* **78–81** *S. crypticum* **74, 75, 78, 79** aedeagus **76, 80** antenna **77, 81** male foreleg. Scales = 0.25 mm (74, 75, 78, 79); scales = 1 mm (76, 77, 80, 81).

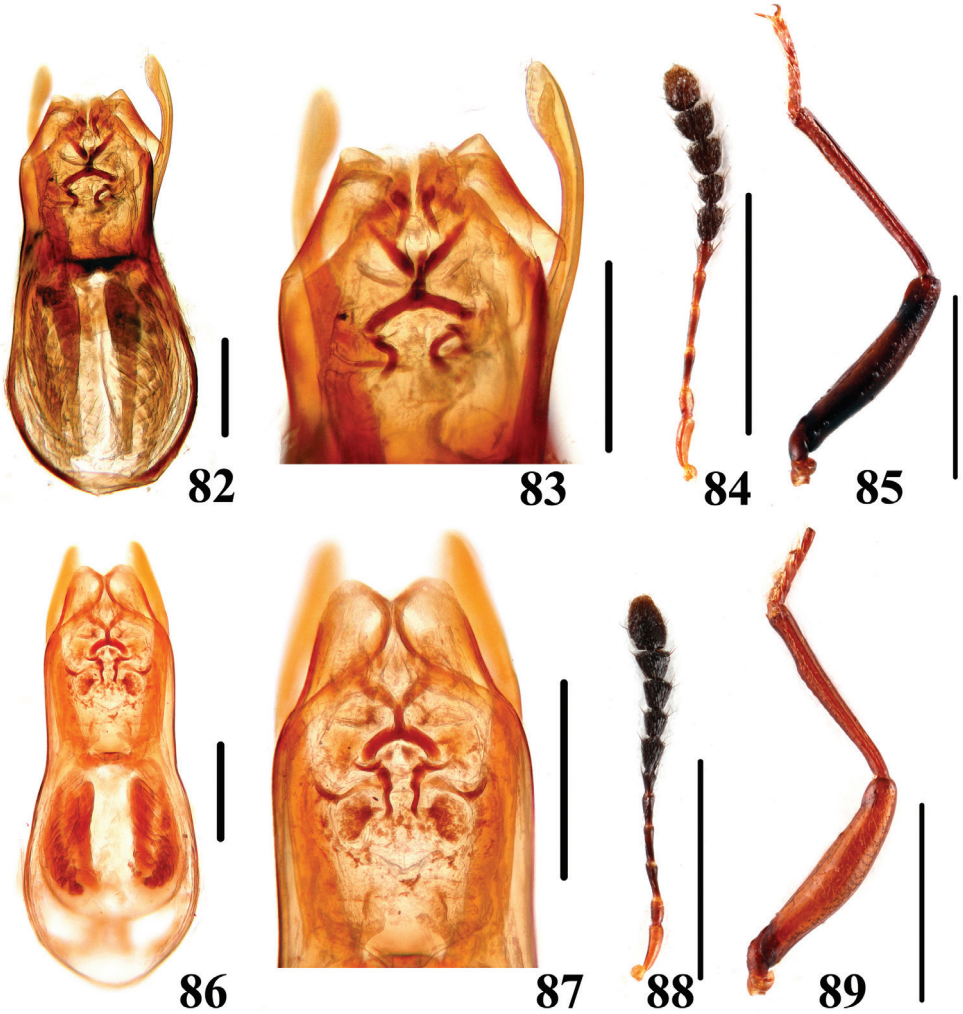
**Remarks.** The new species was once misidentified as *S. vernicatum* in Tang and Li 2010b. It is characterized by its elytra with the subhumeral fascia consisting of two connected yellow dots.

**Etymology.** The Latin adjective “connexum” refers to its subhumeral fascia of elytra consisting of two connected yellow dots.

#### Key to *Scaphidium* species of East China

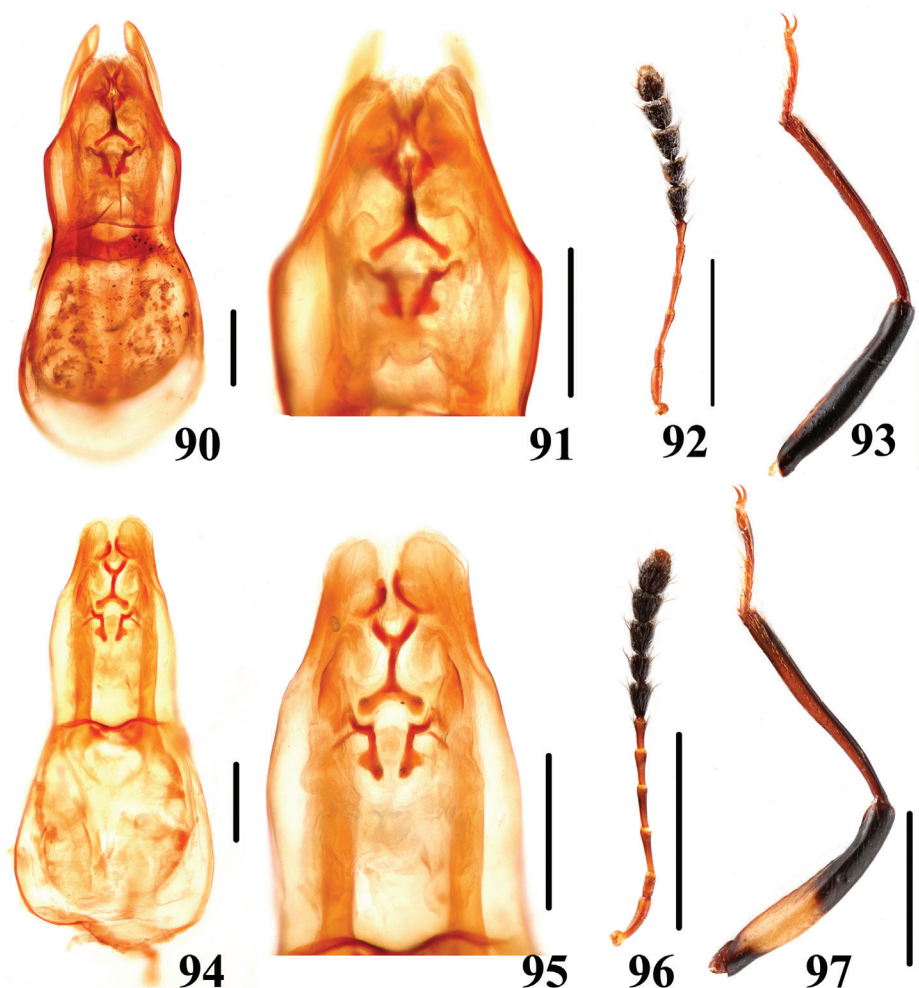
- 1      Body entirely black, sometimes with bluish metallic tint, without fascia .....2





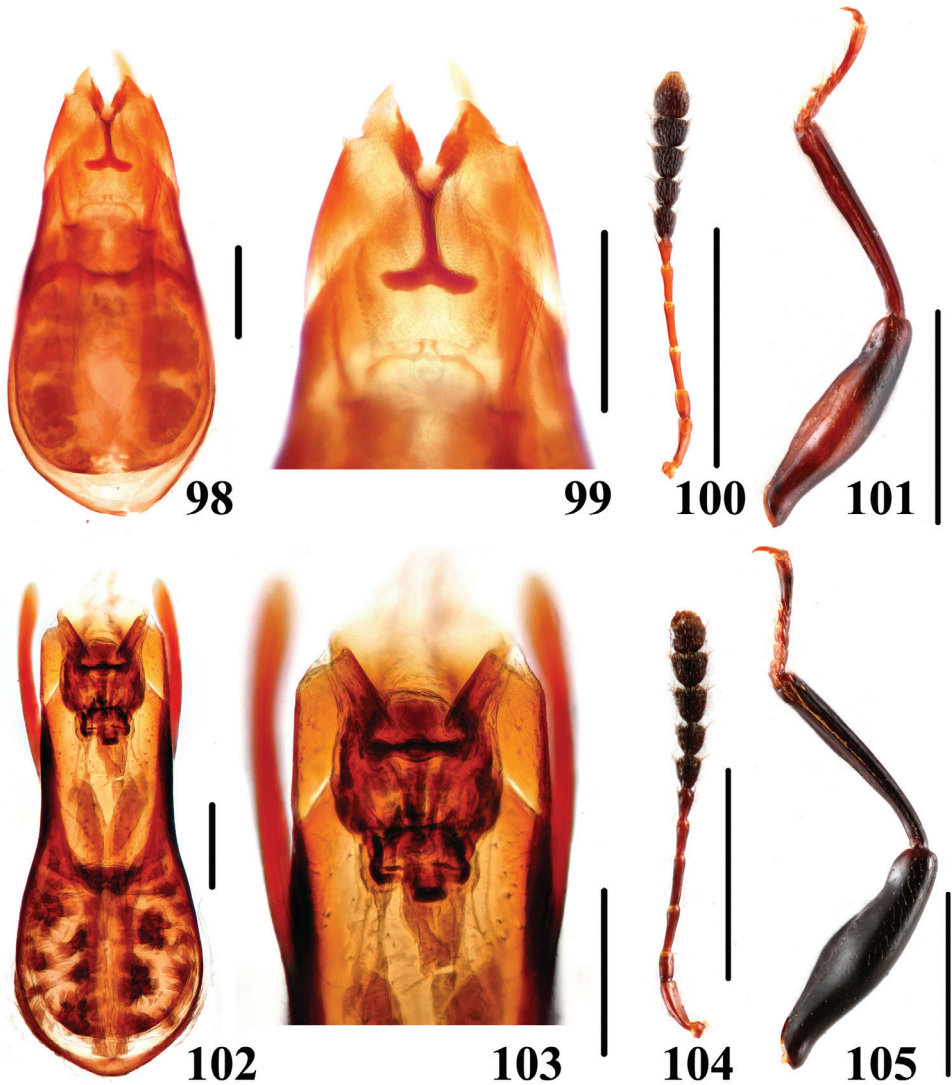
**Figures 82–89.** Characters of *Scaphidium*. 82–85 *S. varifasciatum* 86–89 *S. sauteri* 82, 83, 86, 87 aedeagus 84, 88 antenna 85, 89 male foreleg. Scales = 0.25 mm (82, 83, 86, 87); scales = 1 mm (84, 85, 88, 89).

- Body coloration different, pronotum and/or elytra with fasciae or uniformly reddish.....6
- 2 Larger species, BL $\geq$ 5.9 mm; meso- and metafemora black with reddish fasciae .....3
- Smaller species, BL $\leq$ 5.1 mm; meso- and metafemora blackish or reddish without fascia.....4
- 3 Larger species, BL: 7.3–9.7mm; male profemora and protibiae (Fig. 73) without angle. Habitus (Figs 9, 10), characters (Figs 70–73). China (Chongqing, Sichuan, Guizhou, Hunan, Zhejiang, Fujian, Guangdong, Yunnan,



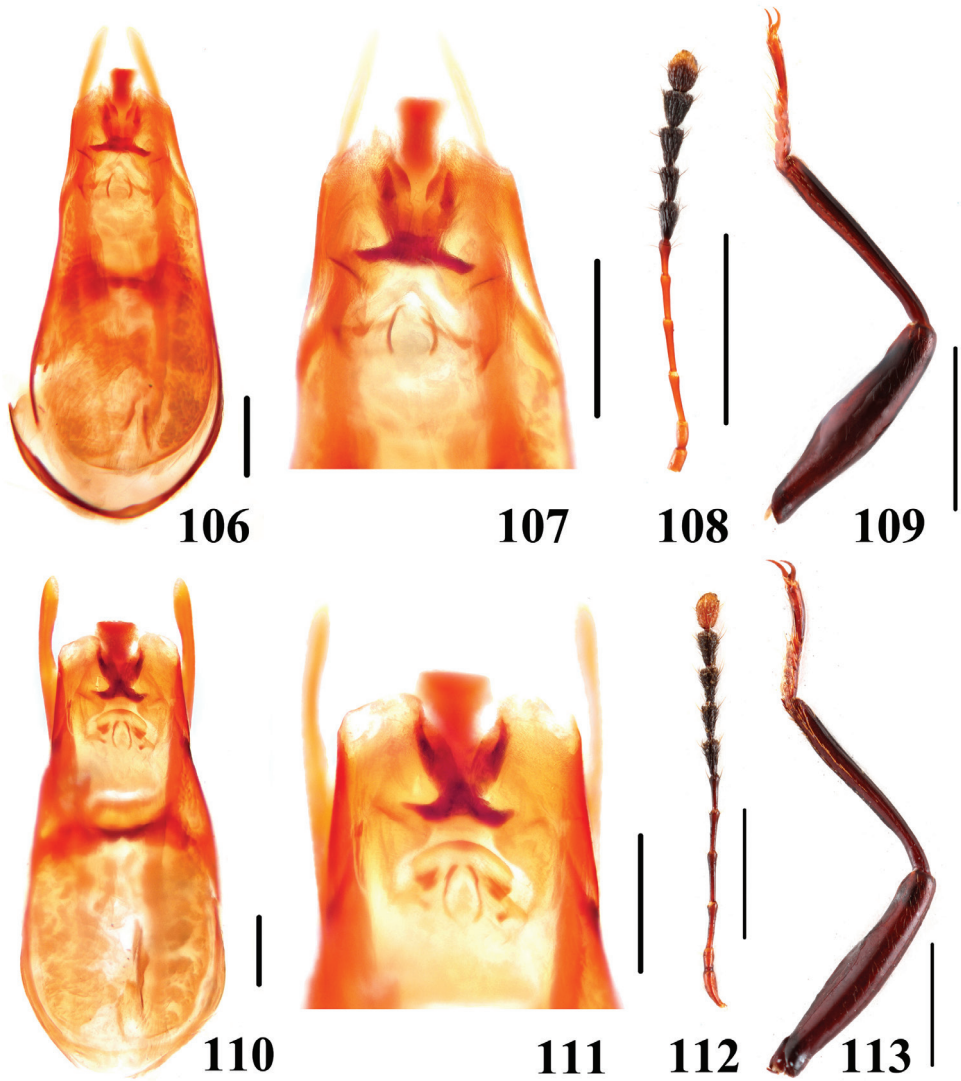
**Figures 90–97.** Characters of *Scaphidium*. **90–93** *S. formosanum* **94–97** *S. carinese* **90, 91, 94, 95** aedeagus **92, 96** antenna **93, 97** male foreleg. Scales = 0.25 mm (90, 91, 94, 95); scales = 1 mm (92, 93, 96, 97).

- Guangxi, Hainan, Taiwan?), Nepal, Myanmar, Thailand, Laos, Malaysia, Vietnam, Indonesia.....*S. grande*
- Smaller species, BL: 5.9–7.3mm; male profemora (Fig. 77) with an acute angle at apical third, protibiae (Fig. 77) with a blunt angle before apical angle. Habitus (Figs 11, 12), aedeagus (Figs 74–77). China (Anhui).... *S. spinatum*
- 4 Body form elongate with lateral sides somewhat parallel; elytra evenly punctate without puncture row..... **5**
- Body form oval; elytra with a puncture row consisting of coarse punctures. BL: 4.1–4.5 mm. Habitus (Figs 7, 8), characters (Figs 66–69). China (Fujian).....  
.....*S. fukiense*



**Figures 98–105.** Characters of *Scaphidium*. 98–101 *S. sinense* 102–105 *S. delatouchei* 98, 99, 102, 103 aedeagus 100, 104 antenna 101, 105 male foreleg. Scales = 0.25 mm (98, 99, 102, 103); scales = 1 mm (100, 101, 104, 105).

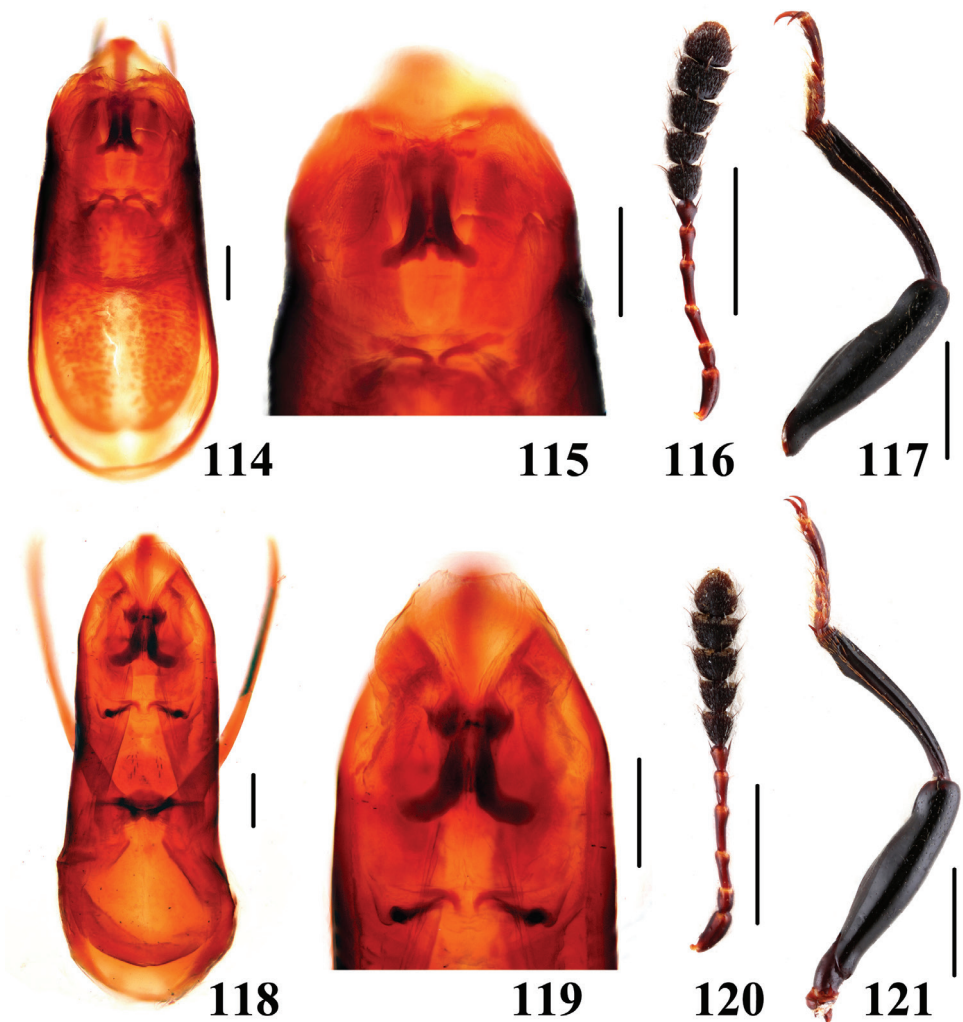
- 5      Body black without metallic luster; male metaventrte with setiferous patch. BL: 3.5–4.4 mm. Habitus (Figs 5, 6), characters (Figs 62–65). China (Zhejiang, Hunan, Hubei, Guangxi, Hainan), North Korea ..... *S. comes*
- Body black with strong bluish metallic luster; male metaventrte without setiferous patch. BL: 4.1–4.9 mm. Habitus (Figs 1, 2), characters (Figs 58–61). China (Zhejiang, Anhui, Chongqing).....*S. jinmingi*



**Figures 106–113.** Characters of *Scaphidium*. 106–109 *S. biwenxuani* 110–113 *S. robustum* 106, 107, 110, 111 aedeagus 108, 112 antenna 109, 113 male foreleg. Scales = 0.25 mm (106, 107, 110, 111); scales = 1 mm (108, 109, 112, 113).

- 6 Elytra reddish-brown and without fascia, pronotum usually with black dots. BL: 3.7–4.6 mm. Habitus (Figs 18, 19), characters (Figs 17, 82–85). China (Zhejiang, Anhui) ..... *S. varifasciatum*
- Elytra with fasciae, pronotum with or without fasciae.....7
- 7 Pronotum reddish-yellow with pair of black fasciae or at least blackish at base.....8
- Pronotum blackish or brownish without fascia ..... 14

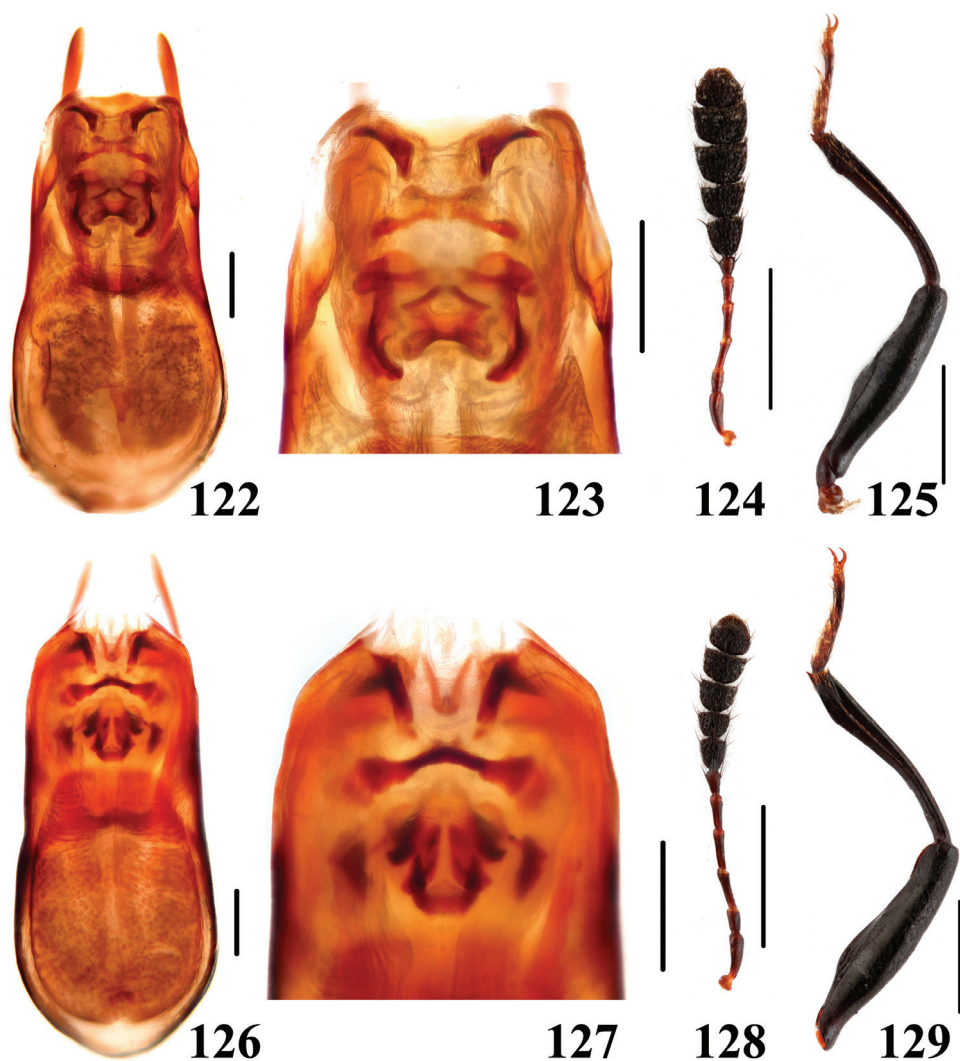




**Figures 114–121.** Characters of *Scaphidium*. 114–117 *S. bayibini* 118–121 *S. klapperichi* 114, 115, 118, 119 aedeagus 116, 120 antenna 117, 121 male foreleg. Scales = 0.25 mm (114, 115, 118, 119); scales = 1 mm (116, 117, 120, 121).

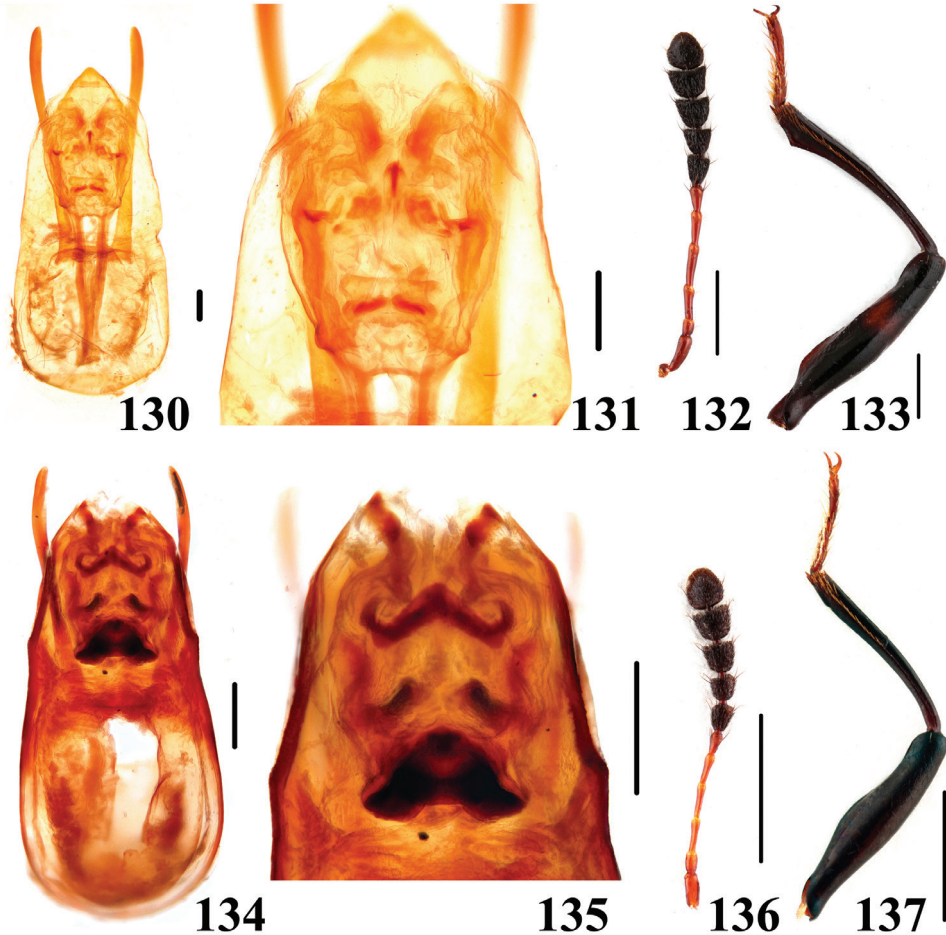
- 8 Elytra each with a humeral black dot .....9
- Elytra without humeral black dot. BL: 3.4–4.3 mm. Habitus (Figs 20, 21), characters (Figs 86–89). China (Zhejiang, Anhui, Fujian, Jiangxi, Guangdong, Guangxi).....*S. sauteri*
- 9 Elytra each with a inner basal black dot .....10
- Elytra without inner basal black dot.....11
- 10 Body larger, BL: 5.7–6.4 mm; terminal antennal segment entirely yellowish. Habitus (Figs 40, 41), characters (Figs 110–113). China (Fujian, Chongqing, Guizhou, Guangxi, Yunnan)..... *S. robustum*





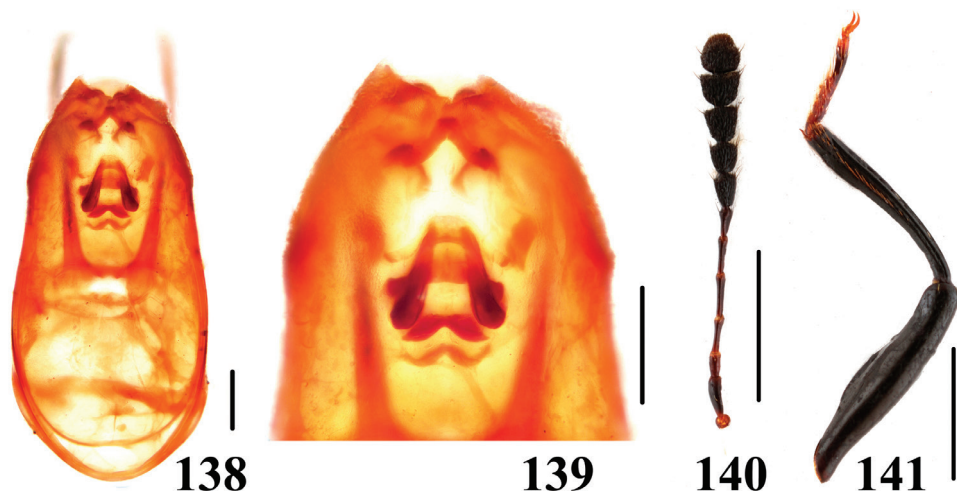
**Figures 122–129.** Characters of *Scaphidium*. **122–125** *S. stigmatinotum* **126–129** *S. wuyongxiangi* **122, 123, 126, 127** aedeagus **124, 128** antenna **125, 129** male foreleg. Scales = 0.25 mm (122, 123, 126, 127); scales = 1 mm (124, 125, 128, 129).

- Body smaller, BL: 4.6–5.7 mm; terminal antennal segment yellowish in apical third. Habitus (Figs 37–39), characters (Figs 106–109). China (Zhejiang, Anhui, Hunan, Hubei, Jiangxi, Guizhou, Sichuan, Yunnan, Guangxi).....  
.....*S. biwenxuani*
- 11 Pronotum reddish-yellow with basal portion blackish, pronotal fasciae usually appeared. BL: 4.1–5.9 mm. Habitus (Figs 29–33), characters (Figs 98–101). China (Zhejiang, Fujian, Jiangxi, Hunan, Guangxi)..... *S. sinense*
- Pronotum entirely reddish-yellow with pair of pronotal fasciae..... 12



**Figures 130–137.** Characters of *Scaphidium*. 130–133 *S. vernicatum* 134–137 *S. direptum* 130, 131, 134, 135 aedeagus 132, 136 antenna 133, 137 male foreleg. Scales = 0.25 mm (130, 131, 134, 135); scales = 1 mm (132, 133, 136, 137).

- 12 Elytra each with a black humeral dot and a large oval black mark on median portion. BL: 4.4–5.1 mm. Habitus (Figs 13–15), characters (Figs 16, 82–85). China (Zhejiang, Fujian, Jiangxi, Guangxi) .....*S. crypticum*
- Elytra each with 4 or 5 black dots ..... 13
- 13 Elytra each with 2 long puncture rows. BL: 5.1–6.1 mm. Habitus (Figs 22–25), characters (Figs 90–93). China (Jiangxi, Fujian, Guangdong, Yunnan, Guangxi, Hainan, Taiwan) ..... *S. formosanum*
- Elytra each with 2 long puncture rows and 2 short rows between long puncture rows and sutural puncture row. BL: 4.2–5.9 mm. Habitus (Figs 26–28), characters (Figs 94–97). China (Hubei, Fujian, Sichuan, Guangxi, Yunnan, Hainan), Myanma. .... *S. carinense*



**Figures 138–141.** Characters of *Scaphidium connexum*. **138, 139** aedeagus **140** antenna **141** male foreleg. Scales = 0.25 mm (138, 139); scales = 1 mm (140, 141).

- 14 Larger species, BL  $\geq 5.4$  mm; pronotal punctation dense and deep ..... **15**
- Smaller species, BL: 4.8–5.8 mm; pronotal punctation sparse and shallow. Habitus (Figs 34–36), characters (Figs 102–105). China (Zhejiang, Hunan, Hubei, Anhui, Sichuan, Yunnan, Guangxi, Guangdong) ..... *S. delatouchei*
- 15 Elytra with one or two black dots entirely sealed in basal fascia ..... **16**
- Elytra without black dot sealed in subhumeral fascia ..... **18**
- 16 Elytra each with 1 black dot sealed in basal fascia. BL: 6.0–8.2 mm. Habitus (Figs 46, 47), characters (Figs 122–125). China (Shaanxi, Hunan, Anhui, Jiangsu, Zhejiang, Fujian, Guangdong, Guangxi, Yunnan) ..... *S. stigmatinotum*
- Elytra each with 2 black dots sealed in basal fascia ..... **17**
- 17 Inner black dot near scutellum reaching basal stria. BL: 6.8–8.6 mm. Habitus (Figs 44, 45), characters (Figs 118–121). China (Zhejiang, Fujian) ..... *S. klapperichi*
- Inner black dot near scutellum departing from basal stria. BL: 6.8–7.5 mm. Habitus (Figs 42, 43), characters (Figs 114–117). China (Anhui) ... *S. bayibini*
- 18 Elytra with subapical fascia transverse and tridentate anteriorly. BL: 5.9–8.0 mm. Habitus (Figs 48, 49), characters (Figs 126–129). China (Zhejiang, Anhui, Jiangxi, Fujian, Sichuan) ..... *S. wuyongxiangi*
- Elytra with subapical fascia round ..... **19**
- 19 Elytra with subhumeral fascia consisting of two connected yellow dots. BL: 5.4–7.1 mm. Habitus (Figs 56, 57), characters (Figs 138–141). China (Zhejiang, Fujian, Guangxi) ..... *S. connexum*
- Elytra with subhumeral fascia consisting of two separate yellow dots ..... **20**

- 20 Body blackish-brown, each femur black with narrow reddish fascia. BL: 8.7–14.3 mm. Habitus (Figs 50–51), characters (Figs 130–133). China (Fujian, Jiangxi) ..... ***S. vernicatum***
- Body reddish-brown, femora entirely dark reddish-brown. BL: 6.9–7.8 mm. Habitus (Figs 54, 55), characters (Figs 134–137). China (Guangdong, Fujian, Guangxi)..... ***S. direptum***

## Biological notes

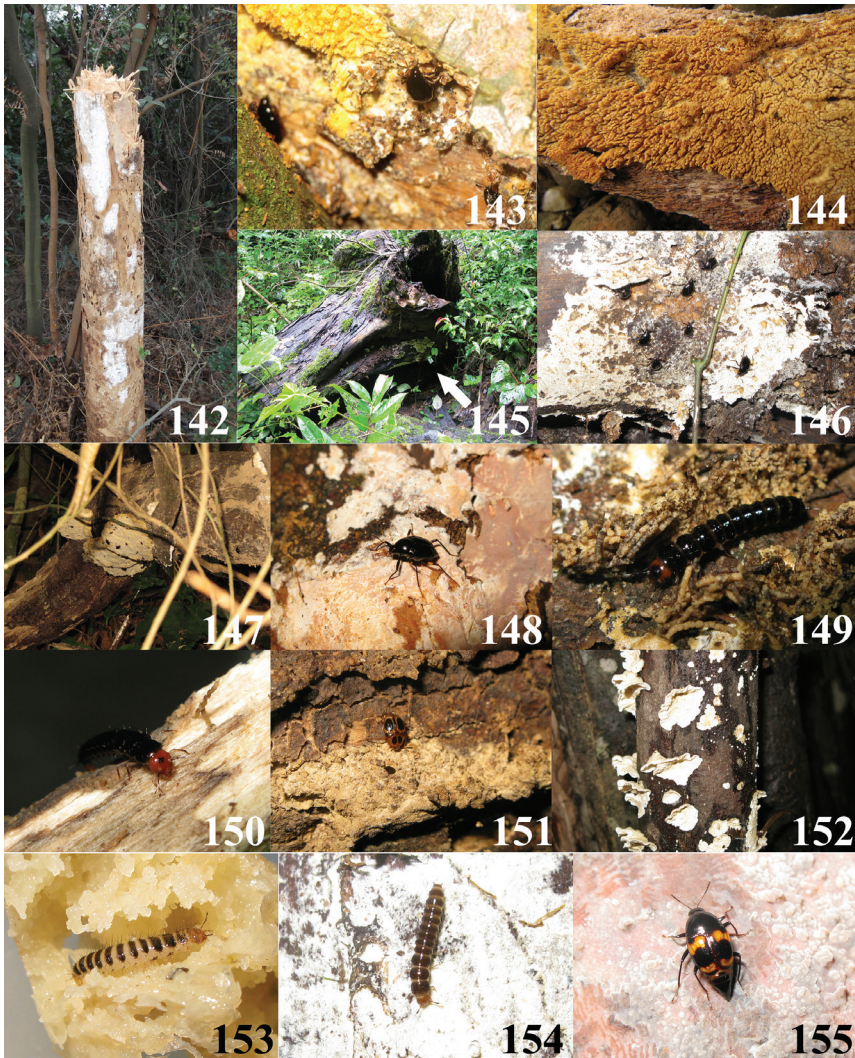
The most abundant species of *Scaphidium* in East China are *S. biwenxuani* (Fig. 156) and *S. wuyongxiangi*, both also distributed in western and southern parts of China, but apparently as smaller populations. *Scaphidium grande* is probably the most widely distributed species in Asia, thriving in only South China and present in middle-latitude zones as small scattered populations. Almost 20 specimens of *S. grande* from Mao'ershan (Guangxi) collected from a large pile of logs along a road far from lush forests indicates its strong dispersal ability. *Scaphidium stigmatinotum* is the most widely distributed species in China, but always found in small populations. This species was even collected in some depauperate secondary forests at low altitude and near cities, e.g. Nanjing and Zhuji, where none of other species has been found, and this may imply its strong endurance of adverse environments.

Most species of *Scaphidium* from East China live in mountain areas, above 800m altitudes, especially during mid and late summer (July and October) which may be hot (sometimes reaching 38 °C) and dry in the lowlands. Only few specimens of *S. comes*, *S. delatouchei*, *S. sinense* and *S. wuyongxiangi* were recorded during this period from the lowlands (about 300m altitudes), while many more species occur in the highlands (about at 1000m altitudes), and in relatively larger numbers. There are also few records of *S. comes*, *S. klapperichi*, *S. sinense* and *S. stigmatinotum* from the lowlands and found in spring or autumn. In several attempts at rearing *S. biwenxuani* and *S. sinense*, larvae were successfully matured at 28–33 °C, showing that at least some species can support such temperatures. Obviously, habitat preferences are determined by the presence of fungi, which depend on temperature and moisture.

Both adults and larvae of *Scaphidium* feed on polyporaceous fungi (Figs 142–166) and usually can be found by searching logs with fungi; two specimens of *S. delatouchei* (Fig. 155) were collected from possibly different, undetermined fungi. The fungi and habitat preferences of *S. jinmingi* and *S. comes* seem to be somewhat different from other species, as most of these two species were gathered on fungus under bark.

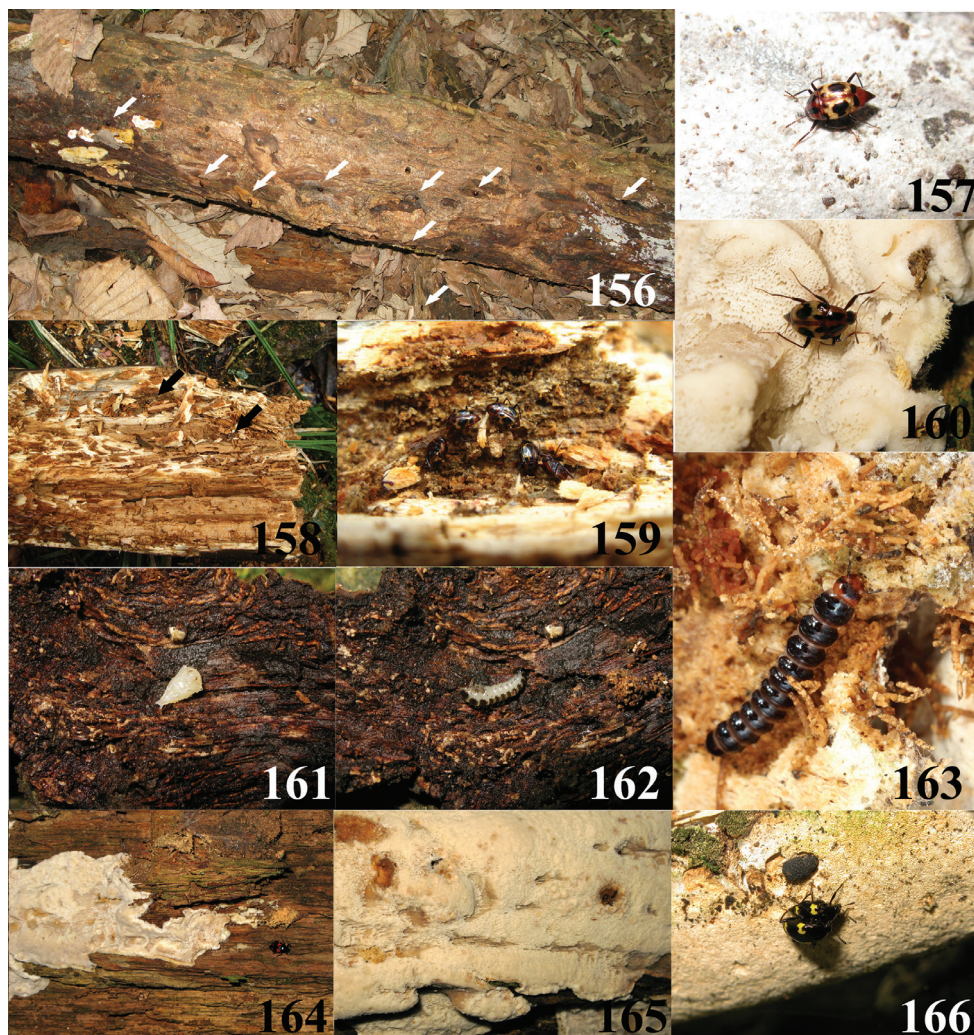
Adults of *Scaphidium* are lucifugous. During the daytime the adults are mostly observed on shaded fungi. Few specimens of *S. wuyongxiangi* and *S. jinmingi* were collected by sweeping which indicates the adults may fly and repose on vegetation during the day. In very dense forests or after nightfall, they are active and reckless. *Scaphidium delatouchei* was observed slowly flying and hovering at dusk. Many adults may be





**Figures 142–155.** **142** Habitat and host fungi of *Scaphidium comes* (Photo by Mr. Zhong Peng from Hunnan, Xiangtan City, Zhaoshan County at 30.I.2011) **143, 144** Host fungi and *S. comes* (Photo by Mr. Jian-Qing Zhu from Guangxi, Shangsi County, Shiwandashan at 23.IV.2011) **145, 146** Host fungi and *S. grande* (Photo by Mr. Jia-Yao Hu from Guangxi, Dayaoshan at 22.VII.2011) **147** Habitat and host fungi of *S. grande* (Photo by Mr. Jian-Qing Zhu from Guangxi, Shangsi County, Shiwandashan at 23.IV.2011) **148** Host fungi and *S. grande* (Photo by Mr. Liang Tang from Guangxi, Xing'an County, Mao'ershan at 7.VII.2011) **149, 150** Larvae of *S. grande* (Photo by Mr. Liang Tang from Guangxi, Xing'an County, Mao'ershan at 8.VII.2011) **151** host fungi of *S. crypticum* (Photo by Mr. Liang Tang from Guangxi, Shangsi County, Shiwandashan at 4.V.2011); **152** host fungi of *S. crypticum* (Photo by Mr. Zi-Wei Yin from Zhejiang, Qingyuan County, Baishanzu at 8.VII.2009) **153** Larva of *S. carinense* (Photo by Mr. Liang Tang in lab at 18.VII.2011, larva collected from Guangxi, Xing'an County, Mao'ershan) **154** Larva of *S. sinense* (Photo by Mr. Liang Tang from Zhejiang, Lin'an City, West Tianmushan at 10.VIII.2010) **155** Host fungi of *S. delatouchei* (Photo by Mr. Liang Tang from Zhejiang, Lin'an City, West Tianmushan at 4.VIII.2010).





**Figures 156–166.** **156** Habitat of *Scaphidium biwenxuani* (Photo by Mr. Liang Tang from Zhejiang, Anji County, Longwangshan at 14.V.2013) **157** host fungi of *S. biwenxuani* (Photo by Mr. Liang Tang from Zhejiang, Lin'an City, West Tianmushan at 22.VIII.2009) **158**, **159** overwinter population of *S. biwenxuani* in cerambycid galleries (Photo by Mr. Wen-Xuan Bi from Zhejiang, Lin'an City, West Tianmushan at 29.I.2009) **160** host fungi of *S. biwenxuani* (Photo by Mr. Liang Tang from Zhejiang, Qingyuan County, Baishanzu at 23.IX.2008) **161**, **162** Prepupa and pupa of *S. biwenxuani* (Photo by Mr. Liang Tang from Zhejiang, Lin'an City, West Tianmushan at 9.VIII.2010); **163** larva of *S. spinatum* (Photo by Mr. Liang Tang in lab at 2.VII.2013, larva collected from Zhejiang, Yuexi County, Yaoluoping) **164**, **165** host fungi of *S. klapperichi* (Photo by Mr. Liang Tang from Zhejiang, Qingyuan County, Baishanzu at 23.IX.2008) **166** host fungi and *S. wuyongxiangi* (Photo by Mr. Liang Tang from Zhejiang, Anji County, Longwangshan at 14.V.2013)

found during night walking on exposed fungi. At that time, they are usually very calm, even under the flashlights and collectors are invisible to them. None was found to be attracted by lamp traps. Larvae are also sensitive to lights. They hide during the day in fecal retreats (see Leschen 1994), and exit to feed during the night.

The reaction of adults towards threats is different between the species, and depends also on temperature. Generally, adults tend to catalepsy and drop into leaf litter below at lower temperatures while they rather more frequently fly away at higher temperature. The length of catalepsy also depends on temperature. Usually it lasts briefly, but can be much longer at lower temperature. Some species are more alert than others. *Scaphidium grande* can notice a collector from meters away and may rapidly fly away, like flies (Figs 145, 146). It is very common to find *S. sinense* and *S. biwenxuani* on the same log in Tianmushan, and individuals of *S. sinense* are always more active and fly away first while *S. biwenxuani* prefers to hide on the opposite side of the log or in cavities. Disturbed adults of *Scaphidium* usually fly for few meters only to rest on surrounding vegetation. They usually fly back to the host fungi after few minutes, if not further disturbed.

The occurrence of larvae is irregular in East China and they may be found consistently from late spring to earlier autumn. Prepupa and pupa of *S. biwenxuani* (Figs 161, 162) were found under loose bark during summer. Several species were successfully reared from larvae to adults. Their photos (Figs 149, 150, 153, 154, 163) are provided in this paper as preliminary information. The adults overwinter usually hidden under bark. Several individuals of *S. wuyongxiangi* from Longwangshan (Zhejiang) were collected under bark in spring when they were still in hibernation. Many specimens of *S. comes* from Hunan were collected in January on fungi under the bark of a coniferous tree trunk (Fig. 142). *Scaphidium biwenxuani* was found in January, gathering in galleries of Cerambycidae (Figs 158, 159).

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# Hidalgo Fishes: Dataset on freshwater fishes of Hidalgo state (Mexico) in the MZNA fish collection of the University of Navarra (Spain)

David Galicia<sup>1</sup>, Griselda Pulido-Flores<sup>2</sup>, Rafael Miranda<sup>1</sup>, Scott Monks<sup>2</sup>,  
Ana Amezcua-Martínez<sup>1</sup>, María Imas-Lecumberri<sup>1</sup>,  
Angel Chaves-Illana<sup>1</sup>, Arturo H. Ariño<sup>1</sup>

**1** University of Navarra, Irunlarrea 1, 31008, Pamplona, Spain **2** University of the Hidalgo State, Centro de Investigaciones Biológicas, Ciudad del Conocimiento, 42184, Pachuca, Mexico

Corresponding author: David Galicia (dgalicia@unav.es)

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## Abstract

The state of Hidalgo (Mexico) is an important region from the point of view of biodiversity. However, there exists a significant gap in accessible knowledge about species diversity and distribution, especially regarding to freshwater ecosystems. This dataset comprises the sampling records of two projects developed in Hidalgo between 2007 and 2009 about the freshwater fish communities of Tecocomulco lake and rivers belonging to the Metztlán Canyon Biosphere Reserve. It contains the taxonomic identity (species level) and basic biometric data (total length and weight) as well as date of collection and coordinates of more than 9000 specimens. This dataset is the primary result of the first and unrepeated exhaustive freshwater fish's survey of Metztlán Canyon Biosphere Reserve and Tecocomulco lake. It incorporates seven more



species to the regional fish fauna, and new exclusive biometric data of ten species. This dataset can be used by studies dealing with, among other interests, North American freshwater fish diversity (species richness, distribution patterns) and biometric analyses, useful for the management and conservation of these areas. The complete dataset is also provided in Darwin Core Archive format.

### Keywords

Occurrence, biometry, freshwater fishes, non-native species, threatened species, conservation, Metztitlán Canyon Biosphere Reserve, Tecocomulco Lake, Mexico

### Introduction

Fauna and flora of Mexico is significant because of its substantial range of climatic conditions. High diversity of freshwater fish is derived from broad transition between temperate and neotropical biota. Of the 504 species known from the country, ca. 271 are endemic (ca. 48 endemics are from binational basins), 168 are at some level of risk, and 25 are believed to be extinct (Contreras-Balderas et al. 2008; Jelks et al. 2008). The fish fauna of Mexico is highly varied, and its complexity and high rate of endemism are the result of a complex orography, hydrography, and diverse climates (Contreras-Balderas et al. 2008).

Hidalgo is a state in the central area of Mexico and an important region from the point of view of biodiversity of freshwater fishes (Miller et al. 2005). However, there is little information on the continental fishes of this area, and significant increase in support and development of research programs are necessary for the region (Pulido-Flores et al. 2008).

This dataset collection contains the sampling records of two projects about the fish communities of Tecocomulco lake and rivers belonging to the Metztitlán Canyon Biosphere Reserve, developed in 2007–2009 in this state.

The Metztitlán Canyon (Barranca de Metztitlán) Biosphere Reserve, in the northern part of this state, has a high level of endemism in plants and animals because of its geomorphologic origin (Monks et al. 2005). This dataset is the primary result of the first and unrepeatable exhaustive freshwater fish's survey of this Biosphere Reserve, adding seven more species to the regional fish fauna, and new exclusive biometric data of nine species (Miranda et al. 2009, 2012). Among these species, there are five exotic species. Future Biosphere Reserve's management plans should consider the presence of these alien species, with the aim to preserve conveniently the biodiversity (Pino-del-Carpio et al. 2011).

Lake Tecocomulco is the only remaining natural water body in the basin of Gran Cuenca del Valle de México (Caballero et al. 1999). The occurrences of freshwater fishes present in this lake included in this dataset comprise the first and largest registered population of Chapultepec splitfin *Girardinichthys viviparus*, a threatened good-eid catalogued as critically endangered by the IUCN (Contreras-Balderas and Almada-Villela 1996). This species show an extremely reduced range of distribution in the Mexican plateau, only known from a few locations near Distrito Federal, Mexico City

(Navarrete-Salgado et al. 2004, Sedeño-Díaz and López-López 2009) until this dataset registration.

Knowledge of species occurrences is the first step to manage and conserve the biodiversity and scarce information related to the distribution, abundance and management actions of threatened species hinder the development of adequate conservation strategies (Pino-del-Carpio et al. 2011). This is particularly relevant to conservation of species with restricted distribution ranges and seriously threatened, as the Chapultepec splitfin. The existence of this population could prove to be determinant for the conservation and survival of this species (Miranda et al. 2008).

## Project details

**Project title:** Freshwater fishes of Hidalgo state (Mexico)

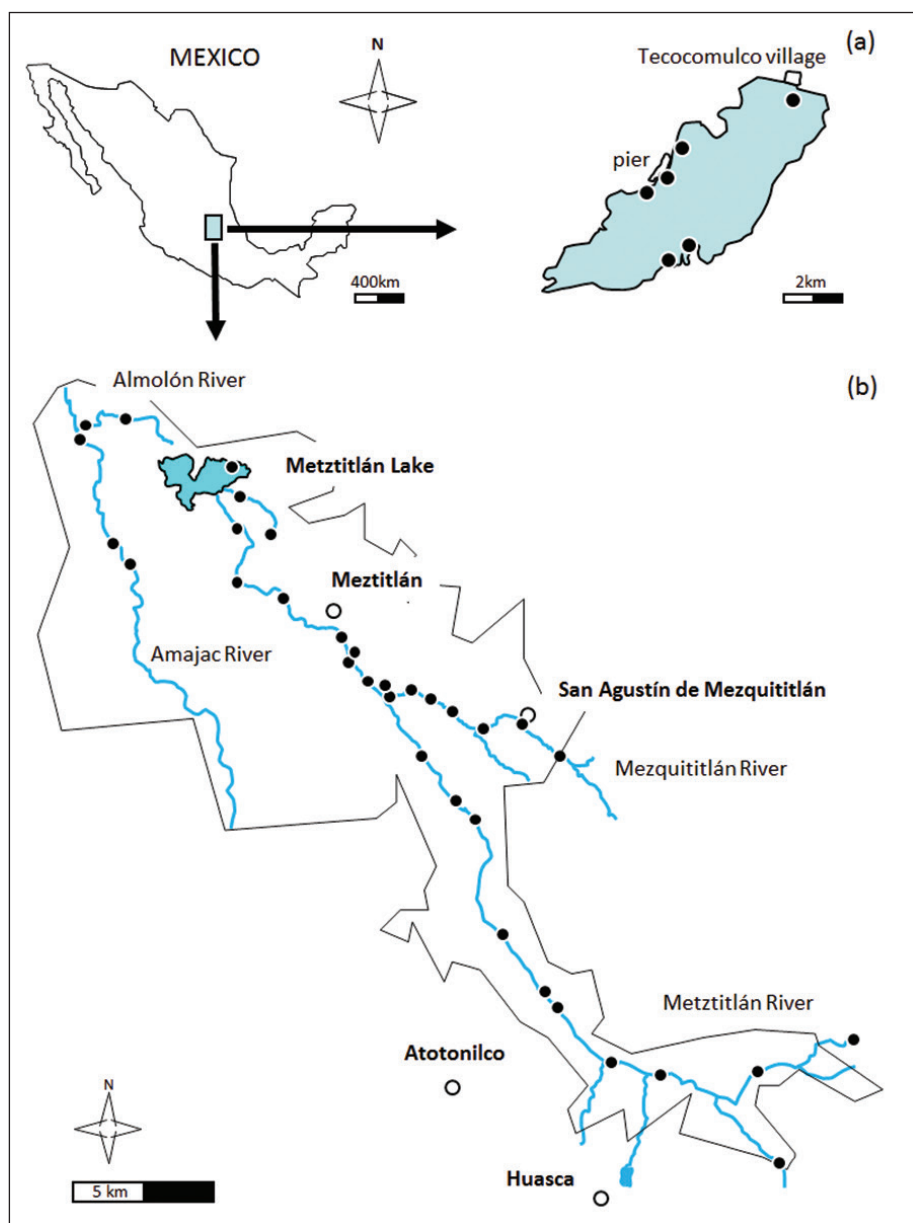
**Personnel:** Rafael Miranda (principal investigator, data collector, collector identifier), David Galicia (researcher, data collector, data manager), Griselda Pulido-Flores (researcher), Scott Monks (researcher), Carmen Escala (researcher), Berenice Alemán-García (data collector), Rafaela Escorcía-Ignacio (data collector), Antonio Vilches (data collector), Christian Elizabeth Bautista-Hernández (data collector), Pedro Manuel Leunda (data collector), Sergio Gaspar (data collector), Andrés López-Morales (field guide, data collector), Ana Amézcua-Martínez (curator), María Imas-Lecumberri (curator), Ángel Chaves-Illana (curator) and Arturo H. Ariño (custodian steward).

**Funding:** Project CGL2006-02844/BOS from the Plan Nacional de I+D+I (2004–2007), Dirección General de Investigación, Ministerio de Ciencia e Innovación, Gobierno de España. Regional Development Fund (ERDF), project FOMIX-HGO-2005-CO1-1 from CONACYT-FOMIX, Hidalgo, Mexico. Agencia Española de Cooperación Internacional of the Ministerio de Asuntos Exteriores y Cooperación, Gobierno de España (A/6357/06).

**Study area descriptions/descriptor:** The state of Hidalgo is located in east central Mexico, at the intersection of the Mexican Neovolcanic Belt, the central highland plateau (Mesa Central) and the Sierra Madre Oriental. Rivers of Hidalgo, part of the Pánuco, Tuxpan and Cazones basins, flow into the Gulf of Mexico. Fishes in the region are relatively diverse and contain Neotropical and Nearctic species, suggesting that this is a transition zone between the two ecozones (Soria-Barreto et al. 1996). The region is characterized by extreme variation in local ecological systems and a high diversity of flora and fauna, produced by geographic isolation of local populations (Pulido-Flores et al. 2005).

The Metztitlán Canyon Biosphere Reserve (Hidalgo, Mexico, Figure 1b) covers an area of approximately 96000 ha and was designated as a biosphere reserve in 2000. The reserve is situated in the rain shadow of the Sierra Madre Oriental, producing an arid climate and receiving just one quarter of the rainfall of nearby areas located at higher elevations within the Sierra Madre Oriental.

Lake Tecocomulco (Figure 1a) is the only remaining natural water body in the basin of Gran Cuenca del Valle de Mexico. Its surface varies from 7 to 15 km<sup>2</sup>, de-



**Figure 1.** Study area. Locations of sampling points (black dots) in **a** Lake Tecocomulco and **b** Metzquitlán Canyon Biosphere Reserve.

pending on the quantity of seasonal rainfall. The lake has turbid and shallow waters, normally with 15–20 m maximum depth, reaching 3 m during some rainy seasons. Sodium, bicarbonates and sulphates are the dominant ions and smaller proportions of

calcium, magnesium and chlorine are present (Caballero et al. 1999). *Scirpus lacustris* L. is the dominant aquatic plant and it extends over much of the central part of the lake. Submerged (*Najas* spp., *Potamogeton* spp.) and free floating (*Lemna* spp.) species are present between the patches of *S. lacustris*.

**Data published through:** GBIF: [http://www.gbif.es:8080/ipt/resource.do?r=pemx\\_mzna](http://www.gbif.es:8080/ipt/resource.do?r=pemx_mzna)

## Taxonomic coverage

**General taxonomic coverage description:** All specimens are identified to species level with the help of authoritative literature (Hubbs 1924, Hubbs and Turner 1939, Miller 1974, Taylor and Miller 1983, Nelson et al. 2004, Miller et al. 2005). Collection comprises 17 species (and two hybrids) of fishes belonging to eight families of the orders Atheriniformes, Ciprinodontiformes, Ostariophysi and Perciformes. Poeciliidae is the most abundant family, represented by seven species in the HidalgoFFishes dataset, being approximately 50% of the total specimens recorded (Figure 2). Table 1 provides an account of the number of specimens, threatened category according to IUCN red list, ecological affinity and the zoogeographic origin of recorded species. This database includes new records for the State of Hidalgo of the channel catfish *Ictalurus punctatus*, two cichlids (*Herichthys pantostictus* and *Amatitlania nigrofasciata*), two goodeids (*Goodea atripinnis* and *Girardinichthys viviparus*) and three poeciliids (*Pseudoxiphophorus jonesii*, *Poeciliopsis gracilis* and *Xiphophorus helleri*). Besides, an undescribed catfish of *Ictalurus* genus has been included on this database (Miller et al. 2005). Among recorded species, there are one species Critically Endangered (*Girardinichthys viviparus*) and other vulnerable (*Herichthys pantostictus*) according to IUCN red list.

## Taxonomic ranks

**Kingdom:** Animalia

**Phylum:** Chordata

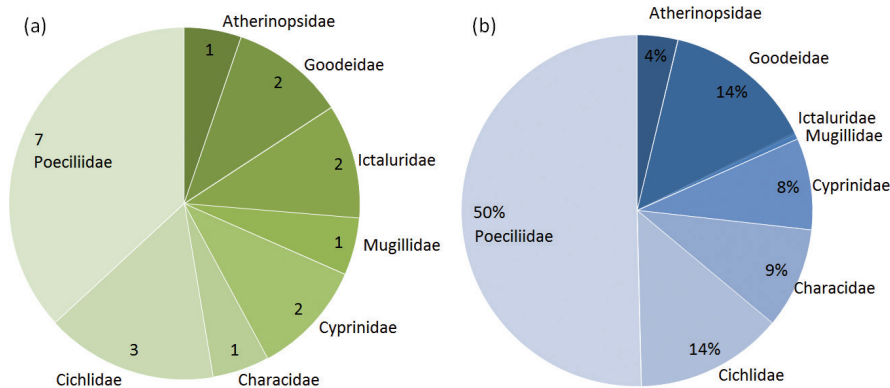
**Class:** Actinopterygii

**Order:** Atheriniformes, Ciprinodontiformes, Ostariophysi, Perciformes

**Family:** Mugilidae, Cichlidae, Characidae, Cyprinidae, Goodeidae, Ictaluridae, Atherinopsidae, Poeciliidae

**Species:** *Agonostomus monticola*, *Amatitlania nigrofasciata*, *Astyanax mexicanus*, *Cyprinus carpio*, *Girardinichthys viviparus*, *Goodea atripinnis*, *Herichthys pantostictus*, *Oreochromis aureus* × *O. niloticus*, *Ictalurus punctatus*, *Ictalurus* sp., *Menidia jordani*, *Poecilia mexicana*, *Poeciliopsis gracilis*, *Pseudoxiphophorus jonesii*, *Tampichthys ipni*, *Xiphophorus birchmanni*, *Xiphophorus birchmanni* × *X. malinche*, *Xiphophorus helleri*, *Xiphophorus malinche*

**Common names:** Mountain mullet, Convict cichlid, Mexican tetra, Common carp, Chapultepec splitfin, Blackfin goodea, Chairel cichlid, Channel catfish, NA, Mesa silverside, Shortfin molly, Porthole livebearer, Barred killifish, Lantern minnow, Sheepshead swordtail, Green swordtail, Highland swordtail, Tilapia.



**Figure 2.** Relative abundance of families. **a** Number of species and **b** percentage of specimens per family recorded in the dataset.

**Table 1.** Species and specimens of fish in HidalgoFFishes dataset. Information about threatened category according to IUCN and additional characteristics are provided.

Family	Species	n	Threatened category	Ecological affinity	Zoogeographic origin
Cyprinidae	<i>Cyprinus carpio</i>	302			Introduced
	<i>Tampichthys ipni</i>	465		Primary	Neartic
Characidae	<i>Astyanax mexicanus</i>	843	Least Concern	Primary	Neotropical
Ictaluridae	<i>Ictalurus punctatus</i>	1		Primary	Translocated
	<i>Ictalurus</i> sp.	18		Primary	Neartic
Cichlidae	<i>Herichthys pantostictus</i>	786	Vulnerable A1c, B1+2c	Secondary	Neotropical
	<i>Amatitlania nigrofasciata</i>	12		Secondary	Translocated
	<i>Oreochromis aureus</i> × <i>O. niloticus</i>	439			Introduced
Atherinopsidae	<i>Menidia jordani</i>	342		Peripheral	Translocated
Mugilidae	<i>Agonostomus monticola</i>	39	Least Concern	Peripheral	Atlantic
	<i>Goodea atripinnis</i>	5	Least Concern	Secondary	Neotropical
Goodeidae	<i>Girardinichthys viviparus</i>	1265	Critically Endangered A1ce+2ce, B1+2abc	Secondary	Neotropical
Poeciliidae	<i>Pseudoxiphophorus jonesii</i>	390		Secondary	Neotropical
	<i>Poecilia mexicana</i>	71		Secondary	Neotropical
	<i>Poeciliopsis gracilis</i>	3230		Secondary	Translocated
	<i>Xiphophorus helleri</i>	891		Secondary	Translocated
	<i>Xiphophorus birchmanni</i>	1		Secondary	Neotropical
	<i>Xiphophorus birchmanni</i> × <i>X. malinche</i>	3		Secondary	Neotropical
	<i>Xiphophorus malinche</i>	2		Secondary	Neotropical



## Spatial coverage

**General spatial coverage:** Hidalgo State, East-Central Mexico. Barranca de Metztitlán Biosphere Reserve (20.23–20.75N; 98.95–98.38W) and Lake Tecocomulco (19.83–19.90N; 98.44–98.35W)

**Coordinates:** 19°49'48"N and 20°45'0"N Latitude; 98°57'0"W and 98°20'60"W Longitude.

## Temporal coverage

The first sample was on February 6, 2007 and the last on November 21, 2008. All the specimens were collected during four two-weeks campaigns that took place at the beginning and ending of the dry season.

## Natural collections description

Zoological Museum of the University of Navarra (MZNA, Pamplona, Spain) was established in the 1980 to curate the scientific research materials of the former Zoology and Ecology and now Environmental Biology department. Its climate-controlled storage facilities hold more than two million specimens, including several type series.

The Museum is a Data Provider for the Global Biodiversity Information Facility (GBIF) and is an Affiliate to the International Commission of Zoological Nomenclature (ICZN). The Museum is also in charge of the curation and management of the Natural History Collections of the School of Science of the University of Navarra (Spain).

**Parent collection identifier:** 850b564a-f762-11e1-a439-00145eb45e9a

**Collection name:** Peces de México

**Collection identifier:** 28c1c18b-64d8-4691-acdb-73e5653292f8

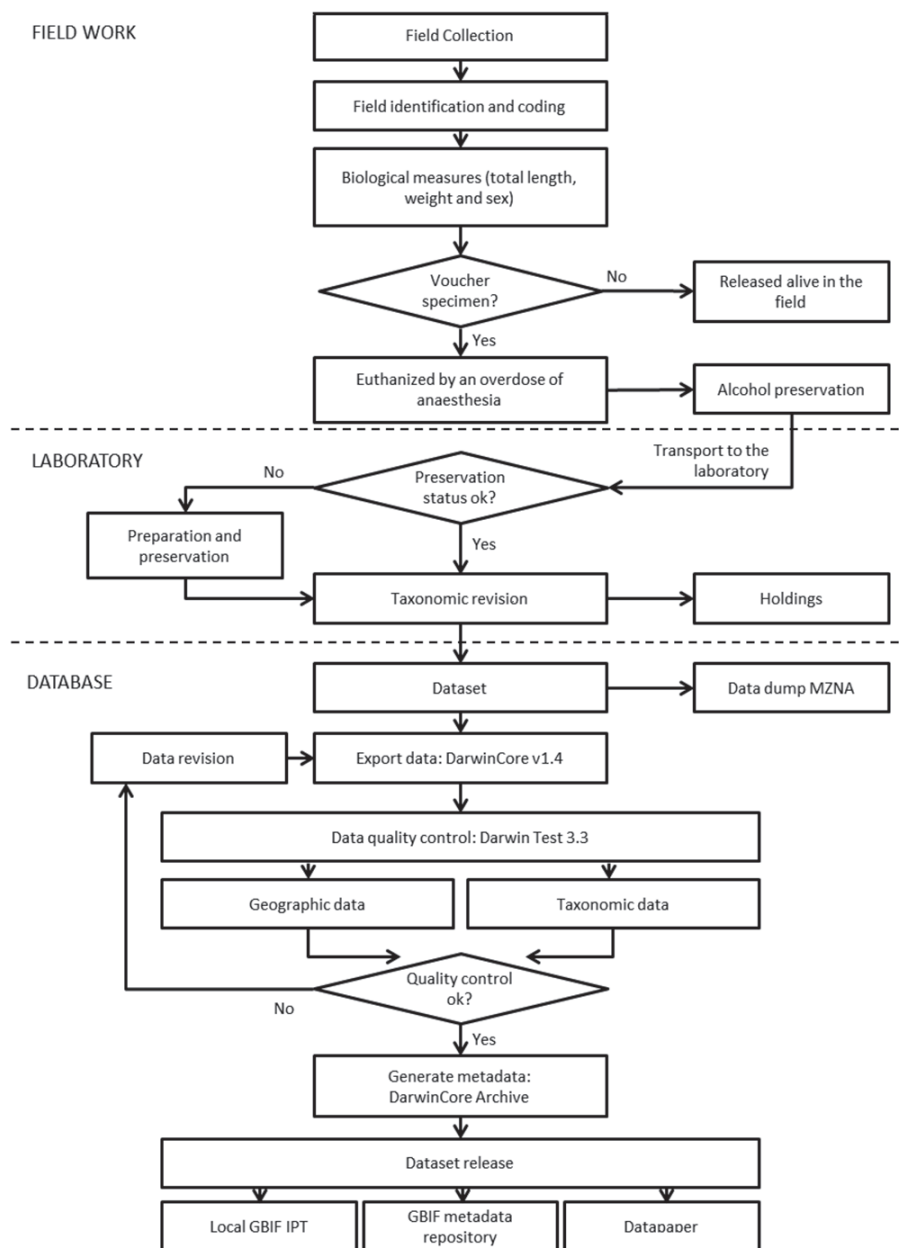
**Specimen preservation method:** Alcohol

**Curatorial unit:** 6453 with an uncertainty of 0 (observation)

**Curatorial unit:** 950 with an uncertainty of 0 (jar)

## Methods

**Method step description:** The processing diagram is shown in Figure 3. Specimens were sampled and processed in the field following the procedure described in the Sampling description section. All the captured specimens were measured, weighted and identified (sex and species) before being released. Some individuals were selected for a deeper study in laboratory and euthanized by an overdose of anaesthesia. Preservation was made directly in the field in 70% ethyl alcohol. Once in the laboratory, all



**Figure 3.** Hidalgo freshwater fishes collection flowchart. The diagram shows all the steps followed from the field sampling to the publishing of the data.

the material was subject of an exhaustive taxonomic revision and field data were corrected accordingly. Project dataset was then incorporated to MZNA database (Zootron v4.5, Ariño 1991), the specimens were then placed in their final containers, consisting

on glass jars with 70% ethyl alcohol, labelled properly and deposited in the MZNA museum holdings (except for a subset of individuals that were vouchered elsewhere, see Quality control description section). Dataset was exported to DarwinCore v1.4 format, revised for data inconsistencies with DarwinCore standards and corrected if necessary. Once dataset quality was assured, metadata information was added and the derived Darwin Core Archive was incorporated to the Spanish GBIF IPT (<http://www.gbif.es:8080/ipt>).

**Study extent description:** The state of Hidalgo is located in east central Mexico, at the intersection of the Mexican Neovolcanic Belt, the central highland plateau (Mesa Central) and the Sierra Madre Oriental (Figure 1). Rivers of Hidalgo, part of the Pánuco, Tuxpan and Czones basins, flow into the Gulf of Mexico. The region is characterized by extreme variation in local ecological systems and a high diversity of flora and fauna, produced by geographic isolation of local populations. The study region is part of the Priorities Hydrologic Region of Mexico because the area is impacted by activities of humans and exhibits high levels of biodiversity (Arriaga et al. 2002). Although this area is important, its ichthyofauna is largely unknown. Some of freshwater fishes included in this dataset are endemics (like the catfish *Ictalurus* sp. or the lantern minnow *Tampichthys ipni*) and threatened (like the Chairel cichlid *Herichthys pantostictus* or the Chapultepec splitfin *Girardinichthys viviparus*). The greatest threats to the long-term existence of these species emerge from agricultural and tourist activities and their effect on the habitat such as exploitation and irrigation for surrounding fields (Miranda et al. 2008).

**Sampling description:** Fourty three localities along the Amajac and Metztlán rivers and Tecocomulco lake were sampled (Collecting permit SGPA/DGVS/060804/06) using a back-pack electrofishing unit (300-600 V, 0.2-2 A) in November 2007 and May 2008. Fish were anaesthetized with tricaine methanesulfonate (MS-222; Sigma Chemical Co., St. Louis, MO) before being sexed, measured (total length, in mm) and weighed (g). Majority of specimens were returned to their habitat. Voucher specimens were euthanized by an overdose of anaesthesia and transported to the laboratory for taxonomic identification and study (Figure 3).

**Quality control description:** Specimens are deposited in the Zoological Museum of the University of Navarra (MZNA, Pamplona, Spain), in the Colección de la Universidad del Estado de Hidalgo (UAEH, Pachuca, Mexico) and in the Texas A&M University, Rosenthal Lab. (A&M, Texas, EEUU).

The taxonomic identity of all the species and hybrids was verified in the laboratory by R. Miranda and D. Galicia using suitable literature (Hubbs 1924, Hubbs and Turner 1939, Miller 1974, Taylor and Miller 1983, Miller et al. 2005). Scientific names were validated according to W. N. Eschmeyer's Catalog of Fishes (Eschmeyer 2014).

Unique collections' accession numbers were assigned to each specimen. Other validation procedures, including geographic coordinates format, and congruence between collection and identification dates were checked with DARWIN\_TEST (v3.3, Ortega-Maqueda and Pando 2008) software (Figure 3).

## Datasets

**Dataset description:** Dataset comprises 7403 registries with information of 38 elements of the DwC standard: id, modified, institutionCode, collectionCode, owner-InstitutionCode, basisOfRecord, catalogNumber, occurrenceRemarks, recordedBy, individualCount, sex, preparations, disposition, eventDate, verbatimEventDate, continent, country, stateProvince, locality, verbatimElevation, minimumElevationInMeters, maximumElevationInMeters, verbatimCoordinates, decimalLatitude, decimalLongitude, geodeticDatum, coordinateUncertaintyInMeters, pointRadiusSpatialFit, identifiedBy, scientificName, kingdom, phylum, class, order, family, genus, specificEpithet, scientificNameAuthorship. Also, a Measurement or Facts extension is included with additional biometric information of the specimens: length (total and with sword in the case of swordtail fishes) and weight.

**Object name:** Darwin Core Archive Freshwater fishes of Hidalgo State (Mexico) in the MZNA fish collection of the University of Navarra (Spain)

**Character encoding:** UTF-8

**Format name:** Darwin Core Archive format

**Format version:** 1.0

**Distribution:** [http://www.gbif.es:8080/ipt/archive.do?r=pemx\\_mzna](http://www.gbif.es:8080/ipt/archive.do?r=pemx_mzna)

**Publication date of data:** 2014-01-24

**Language:** English

**Licenses of use:** This dataset [Freshwater fishes of Hidalgo State (Mexico) in the MZNA fish collection of the University of Navarra (Spain)] is made available under the Open Data Commons Attribution License: <http://www.opendatacommons.org/licenses/by/1.0/>.

**Metadata language:** English

**Date of metadata creation:** 2014-03-25

**Hierarchy level:** Dataset

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